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Skyways FOR BUSINESS

NATIONAL BUSINESS AIRCRAFT ASSOCIATION OFFICIAL PUBLICATION

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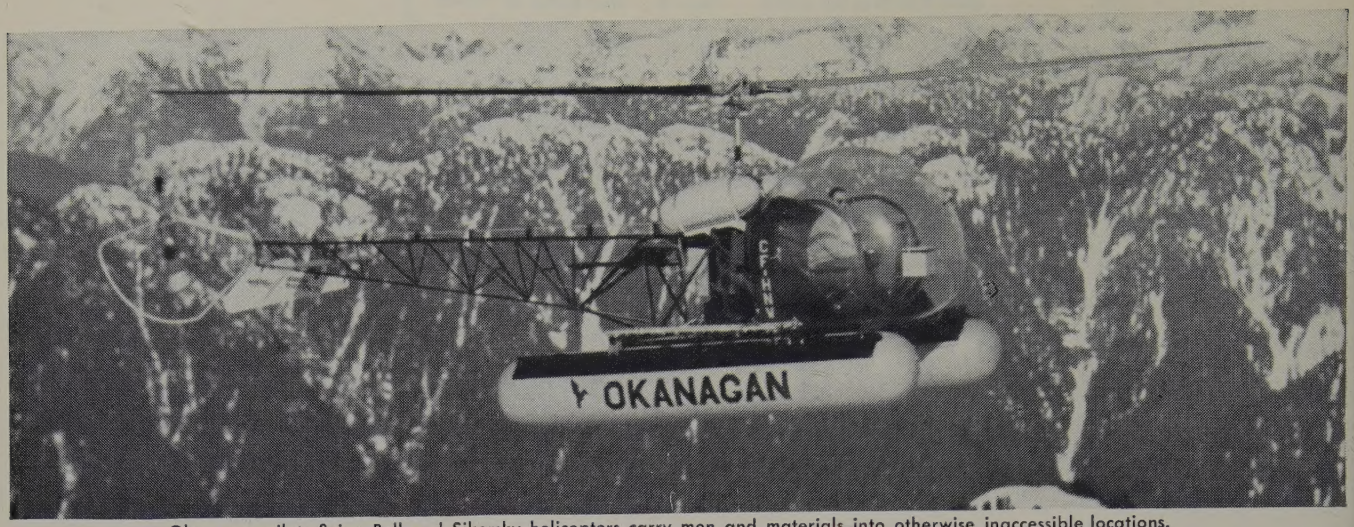
AN "EXECUTIVE PILOT AND HIS BOSS"

- All-Weather Air Navigation and Traffic Control System
- Problems of Crew Management
- Airways Facilities of the Future
- Jet Noise



Okanagan pilots flying Bell and Sikorsky helicopters carry men and materials into otherwise inaccessible locations.

"Aeroquip Simplifies Hose Line Replacement at Our Maintenance Base or in Remote Areas"

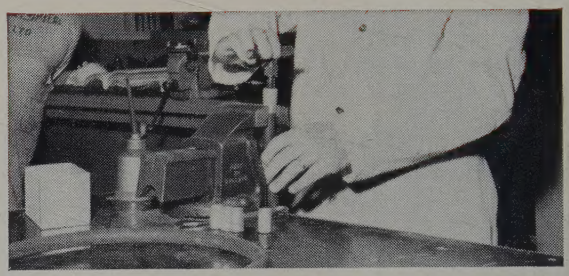
"WE USE AEROQUIP EXCLUSIVELY ON OUR HELICOPTER FLEET"

Reports Alfred Stringer, V. P. in charge of operations, Okanagan Helicopters Ltd., Vancouver, B. C.

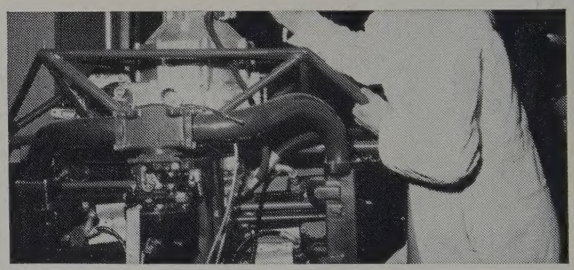
Operating the Okanagan fleet of 29 helicopters throughout Canada calls for unusual maintenance procedure. Craft are often assigned to extended surveys in remote areas, and licensed air engineers must accompany pilots to make periodic inspections and emergency repairs.

That's why the Okanagan Group has standardized on dependable Aeroquip Hose Lines for replacement applications at the base and in the field. Aeroquip Bulk Hose and Detachable Fittings can be assembled at the Vancouver maintenance base or in remote areas. And, replacement costs are lowered because Aeroquip Fittings can be used again and again.

Whether you operate commercial, business or private aircraft, let the 'Aeroquip idea' simplify your replacement needs, too. Call the Aeroquip Distributor at your air terminal, or write us for information.



Aeroquip Hose Lines are assembled as needed, using ordinary bench tools.



This air engineer is installing an Aeroquip Hose Line on the Franklin Power Pak of a Bell helicopter.

Aeroquip

REG. TRADEMARK

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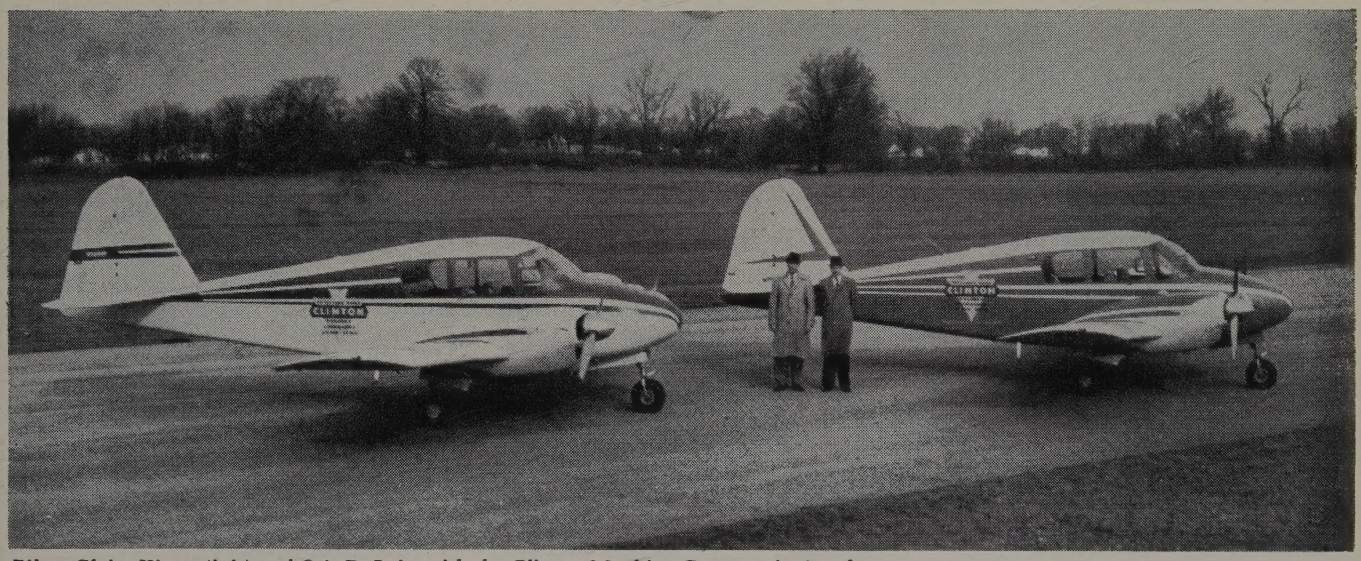
Two Apaches Mean Low Cost, Reliable Transportation for Clinton Machine

Clinton Machine Company of Clinton, Michigan, and Maquoketa, Iowa, uses two twin engine Piper Apaches to provide fast, dependable transportation for executive and sales personnel and speedy service to customers.

Clinton Machine's two full-time executive pilots, Otis R. Leist and Claire Wertz, each flew 1,000 Apache hours last year, VFR and IFR. One of the Apaches is based at Tecumseh, Mich., the other at Davenport, Iowa. Both are flown regularly in and out of the small sod field at Maquoketa.

"Clinton Machine bought its first Apache in July, 1954," says Mr. Wertz. "This has since been replaced by two other Apaches. A total of 4,600 hours or three quarters of a million miles have been logged in these aircraft in the transaction of company business. The Apache has proved a real workhorse, very reliable and performing admirably in accordance with Piper's specifications. Cost-wise, we are convinced that the Apache is also the most economical aircraft to operate."

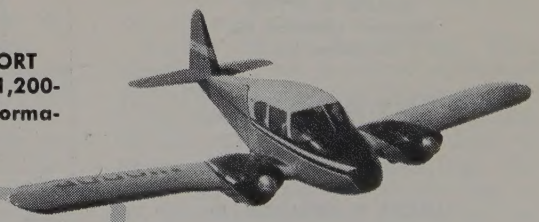


Pilots Claire Wertz (left) and Otis R. Leist with the Clinton Machine Company's Apaches.

Mr. Leist adds: "The Apache's good cockpit visibility, tricycle landing gear and small field performance give a pilot confidence in flying busy company flight schedules. The twin engine safety makes for ease of operation at night and over the top on instruments, with IFR let-downs at the destination. From a pilot's viewpoint, the Apache is very dependable in all phases of our company flying."

PIPER *Apache*

WORLD'S LARGEST SELLING, MULTI-ENGINE EXECUTIVE TRANSPORT
4 or 5-passenger capacity. 170 mph cruising speed. Up to 1,200-mile range. Powered with two 150 hp Lycomings. For full information see your Piper dealer or write for catalog, Dept. K-6.



MORE PEOPLE HAVE BOUGHT PIPERS THAN ANY OTHER PLANE IN THE WORLD

PIPER AIRCRAFT CORPORATION
LOCK HAVEN, PENNSYLVANIA

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JUNE, 1957

Skyways FOR BUSINESS

The official publication of the National Business Aircraft Association

COVER: President Eisenhower chats with his pilot, Lt. Col. William Draper, before a flight in the blue-and-white Aero Commander. A typical trip from Washington National to the airport at Gettysburg takes about 31 min., and 29 min. for return. The Gettysburg airport, located about 6 mi. from the President's farm, is a 2200' sod field. The President describes the Aero Commander as "a lovely plane, everything . . . very convenient." A Bell H-13J helicopter was recently provided to ferry the President between the White House and Washington Airport, and for evacuation in case of emergency.

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LOIS HENRY
EDITORIAL ASSISTANT
George Watts
CONTRIBUTING EDITORS
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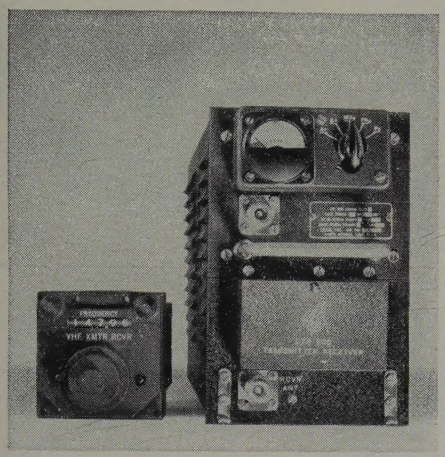
800 channel VHF TRANSCEIVER



LEAR LTR-800

UNEQUALLED FREQUENCY FLEXIBILITY The LTR-800 can be equipped with crystal combinations to provide any or all of the transmitting and receiving frequencies which can be implemented in the 108-148 mc VHF band on the basis of 100-kc spacing (400 channels) or 50-kc spacing (800 channels)—more than enough for all foreseeable needs. A moderate number of channels can be activated originally and additional crystals installed as needs increase.

VOR, VAR, and ILS These navigation facilities can be fully utilized through the LTR-800's provisions for operation of either manual or automatic omni accessory equipment (converter and course selector).

COMPACTNESS Miniaturization and numerous advanced design features make the LTR-800 especially suitable for installations where small size and light weight are particularly important. Transmitter and receiver are in a single ½ ATR rack-sized package weighing less than 25 pounds.

NEW HORIZONTAL DIGITAL PRESENTATION Electric powered remote control (no flex shaft or other mechanical linkage) features new, easy-to-read horizontal digital presentation of frequency. With the addition of a second control head, the LTR-800 can be used for cross channel operation, as well as simplex.

OTHER FEATURES Designed to meet military, CAA, and airline requirements • Dynamotor power supply • Multi-purpose meter for pre-flight checks • Forced air cooling • Superior reliability—etched circuit construction • Automatic squelch • Side tone on transmitter • ARINC ruggedized premium tubes • Automatic noise limiter in receiver • Highest quality components throughout.

For complete details see your nearest Lear distributor or dealer, or write directly to LearCal Division, 3171 South Bundy Drive, Santa Monica, California.

LEAR

now hear this . . .

Howe H. Hopkins was named Chief Engr. of Aircooled Motors, Inc., Syracuse, N.Y., mfrs. of Franklin aircraft engines. Prior, Hopkins served with Continental Av. & Engrg.

Joseph P. Adams, recent V-Chairman of CAB & member NACA, announces opening of law offices specializing in federal depts.

Robert E. Strasser joined Fairchild Engine Div. as Customer Relations Rep. in the W. Coast Office.

Vernon A. Johnson named to new position as Dir. of Corporate Outside Offices, Lockheed Aircraft Corp.

David D. Mason, V-P of Link Aviation, was appointed to the new position of Asst. Gen. Mgr. to E. Allan Williford, Link Pres.

Jim Wells is new asst. Washington rep. for Bell Aircraft Corp.

Dr. Bernard M. Sturgis, Dir. of DuPont Petroleum Lab., was appointed to NACA sub-committee for aircraft fuels.

Robert J. Smith, Pres. of Slick Airways, was re-elected to that position at the meeting of stockholders. Re-election of present Bd. of Dir. was unanimous; includes **Delos W. Rentzel,** Chmn. of Bd., **E. F. Slick,** Chmn. of Exec. Comm., **T. B. Slick,** partner in Slick Moorman Oil Co., San Antonio.

Theodore Voorhees was appointed Gen. Mgr. of the International Div. of Bendix Av. Corp.

Jay J. Newman is new Mgr. of New Prod. & Market Development of RCA Components Div.

Jack Wright promoted to Mgr. of Garrett Corp.'s Aero Engrg. Div.

W. W. Lampkin, Dir. of Mfg. for Aircraft Div., Hughes Tool Co., was elected Nat'l Chmn. of AIA Mfg. Committee. **G. T. Willey,** V-P Mfg. for Glenn L. Martin Co., is V-Chmn. of AIA committee.

John E. Canaday has been elected a V-P of Lockheed Aircraft Corp., in charge of Pub. Rel.

Robert P. Williams, Jr., is new Washington Rep. of Kellett Aircraft Corp.

Clare E. Barkalow is new Assoc. Mgr. of Advanced Engrg. Div., Lear, Inc.

M. L. Van Slyck was elected to Bd. of Dir. of Fairchild Camera & Instrument Corp.

Henry J. Fredericks was named Treasurer-Controller of Pratt & Whitney Corp.

Joseph Mashman is new Acting Administrator of Commercial Sls. for Bell Helicopter Corp. He will continue as Sls. Planning Dir.

John T. Mallen is new Midwest Sls. Mgr. for Electronic Prods. of Sylvania.

Lee S. Johnson, Gen. Mgr. of Sikorsky Aircraft, has been elected a V.P. of United Aircraft Corp.

John W. Anderson is Engrg. Dir. for the inertial guidance facility under construction by Mpls-Honeywell at St. Petersburg, Fla. **C. H. Kelly** is personnel Mgr. for the new operation.

David J. Bowman has been appointed Sls. & Service Mgr. for Colonial Aircraft Corp., mfrs. of the *Skimmer* amphibian. **Win Young** is new Chief of Flight & Mgr. at the Sanford, Me., facility.

Edward C. Marsh has been appointed Deputy Administrator of CAA's 3rd Region at Kansas City, Mo.; prior, he was Chief, Aircraft Engrg. Div., Region 1, N.Y.

D. H. Thompson is new V.P. for Southeast Region, American Helicopter Society.

H. R. Alexander was named Western Reg. Customer Rel. Mgr. for Stratos Div., Fairchild Engine & Airplane Corp.

A. Warren Urich was named controller of the Frank R. Cook Co., Denver's 1st avionics manufacturing co.

Leo Stamler is new Staff Engr. with the Industrial Sls. Dept. of Servo Corp. of America.

Martin Elander, Secy. and Treas. of United Aircraft Corp., was also named Vice Pres. in charge of finance.

Baboo Ram Teree was elected Vice Pres. in charge of engrg. and mfg. for Greer Hydraulics. Prior, Teree was Chief Engr. & Engrg. Mgr.

Joseph A. Frabutt was named Pres. of the new IT&T Industrial Prods. Div. He will continue as Gen. Mgr. of the div.'s W. Coast aircraft prods. plant. **Ralph Lehman** is Mgr. of Commercial Av. Prods.; **David Monro** is Mgr. of Airborne Integrated Power Supply Ops.

Wayne B. Johnson is Mgr. of the new Product Planning Div. of Lear, Inc. **Vito S. Battaglia** is head of Lear's new Projects Control Div.

E. T. Uptain (USN Ret.) has joined Electric Auto-Lite Co. as aircraft field technical specialist.

W. J. Rutherford was named Av. Sls. Mgr. by General Logistics, a div. of Aeroquip Corp.

J. J. Nopper is new Merchandising & Sls. Staff member of Champion Spark Plug Co.

J. W. Stack is appointed Dir. of Sls. & Contracts for Milwaukee plants of AC Spark Plug Div. of GM Corp.

Victor F. Kent is new Asst. A. M., Sls. Prom., for Aeroquip Corp.

J. G. Weldon was named Hydraulic Sls. Mgr. for Pacific Div., Bendix. **R. G. Hoof** was appointed Electro-Mechanical Mgr.

Lucius W. Burton has been named to the newly created position as Planning and Development Director of CAA. Burton's office will initiate research and development activities for all CAA program areas, and maintain liaison with the Curtis committee and other aviation research agencies.

COMPANIES

Computing Devices of Canada, Ltd., will handle Canadian sales of Bendix Aviation electronic equipment.

Garrett Corp.'s Aero Engrg. Div., Mineola, N.Y., has announced opening of a new branch office in the Chicago area.

Air Associates, Inc., Teterboro has officially changed the company name to **Electronics Communications, Inc.** The name "Air Associates" will now refer to the division heretofore known as the "Aviation Supplies Div." Changes are reported not to involve any merger or other change in corporate structure.

Jack Adams Aircraft Sls., Memphis, has been appointed distributor for Beech aircraft in parts of Tenn., Miss. and Ark.

Military tactics today demand AIR mobility for GROUND forces

The Army **H-23C**, built by Hiller, is currently in widespread service.

One of the oldest requirements in military tactics is *mobility*. In today's atomic concepts, that means getting the Army *off the Ground*. So well proved are advantages of the helicopter for Army use that the only big question now is how to reduce operating costs so that *more* helicopters can be used by *more* units! The Army H-23D now in production and scheduled for delivery this year represents a major step forward in the goal of attaining lower costs through longer service — 1000 hours — between overhauls.

400 HRS.

The Army H-23C

1000 HRS.

The Army **H-23D** is the first helicopter designed to incorporate the Army's concept of a 1000 hour overhaul cycle on major components.

Engineers: write for opportunities with an industry leader in an ideal California locale.

HILLER HELICOPTERS

PALO ALTO, CALIFORNIA

AIR YOUR VIEWS

To the Editor:

In your April Jet Round Table, the word "hypoxic" on Dr. White's doodle stopped me in my tracks, and I went back to see what he had to say about it. Dr. White might be interested to know that, in my opinion, normal people can be overcome by hypoxia at even 12,000′.

My husband pilots Camcar Screw & Mfg. Co.'s Twin Beech. We had been at 9000′ to 12,000′ for 2 hrs., then had a 2½ hr. wait on the ground, followed by 1½ hrs. at about the same altitude. It took no more than 2 or 3 min. from the first warning tingle until I was completely rigid and using every once of strength to breathe. My husband and his co-pilot receive my personal "Silver Star" for expediting the landing and administering oxygen simultaneously in record time. Eighteen hrs. on oxygen in the hospital and a few days' rest restored me to normal good health, but it was a terrifying experience.

As a result of this experience, Rick is having the oxygen system in his ship improved so that it is more easily and quickly available throughout the ship. I hope every pilot who reads this goes right out and checks his oxygen system, and uses it above 8000′, because if a pilot were to develop the same symptoms as mine it would almost surely result in a crash, unless oxygen is *immediately* applied. Physical exams or not, there isn't a pilot flying today who is any healthier than I am.

(Mrs. Richard B.) Gail Ravitts

Ed. Note: If a survey were made of the number of pilot and passenger hours flown without oxygen or pressurization above 8000′, the results might not substantiate Mrs. Ravitts' point. Nevertheless we feel that her experience is pertinent, and besides, as with insurance risk quotations, who wants to be a statistic?

To the Editor:

We have read with much interest the article entitled "Get the Full Treatment," by Capt. Chuck Banfe, which was published in the April '57 issue of SKYWAYS. Capt. Banfe has done an excellent job in highlighting the importance of weather briefings to the pilot.

D. M. Little, Deputy Chief, Weather Bureau U.S. Dept. of Commerce

To the Editor:

Your editorial in the Feb. issue of SKYWAYS—"A National Civil Air Show"—was tremendous. Congratulations!

The need to jar the American public into cognizance that aviation, in other than defensive form, is here to stay, is indicated by a sharp decline in private flying, and I feel reasonably sure that a National Civil Air show could do much to change this condition.

Since 1950 Reading Aviation Service has annually held a Maintenance and Operations Meeting which in most respects fulfills the requirements for a National Air Show as outlined in your editorial. At these meetings it has been our aim to create an awareness of the airplane as the modern means of transportation, not only to industry, but to the American businessman.

Here, the Flying Farmers, Doctors, 99ers, industrial owners, airlines and private pilots have gathered each year in increasing numbers. Industry has given its support with displays of equipment, new aircraft, and flight demonstrations. For the past 3 yrs., Reading Aviation Awards have been made to all classes of aircraft for high standards of maintenance, equipment, appearance and compliance with accepted standards.

Outstanding men in the industry present talks on current topics of interest. The City of Reading has given its support to this cause, and has cooperated in every way to support and publicize these meetings.

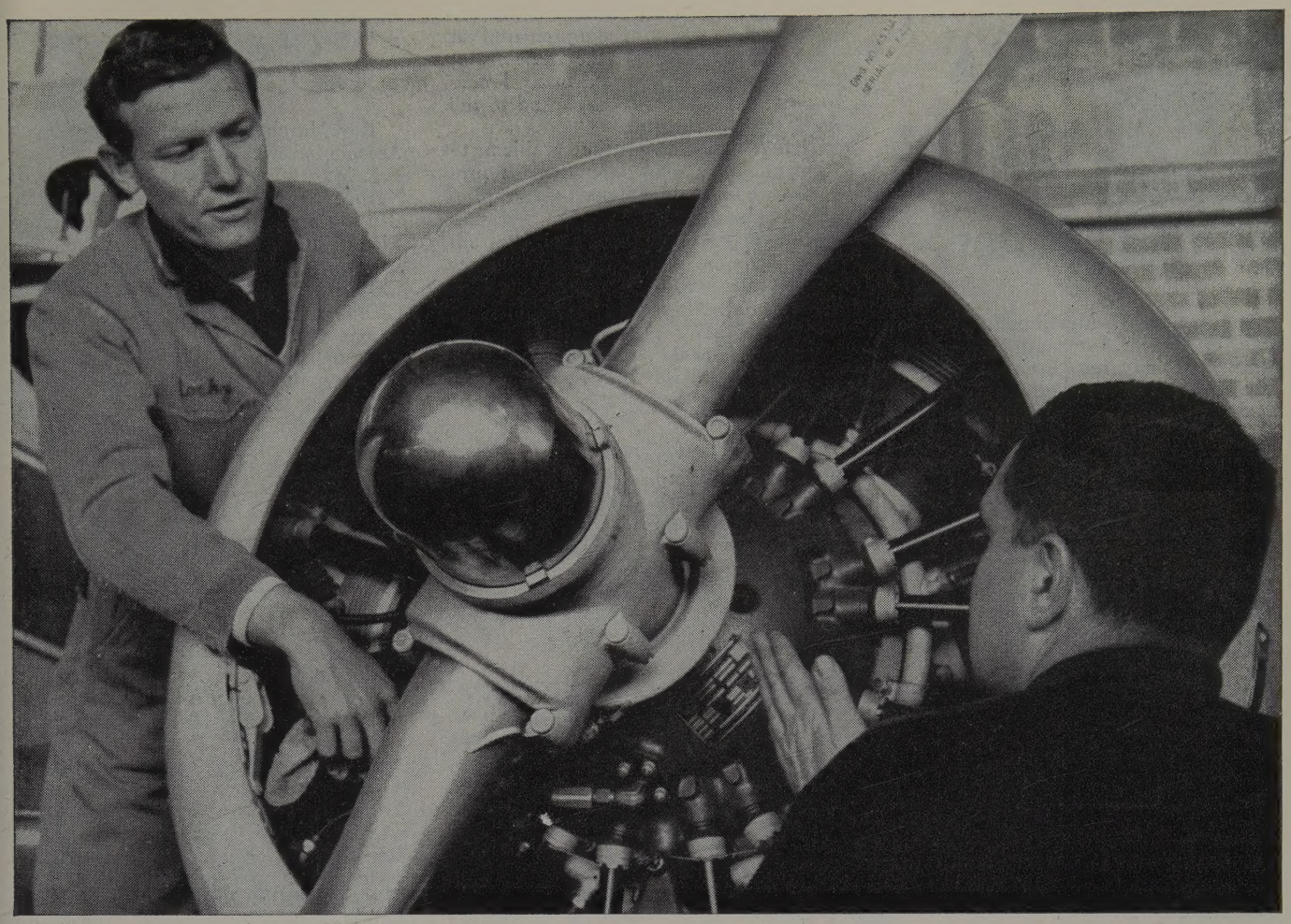
With the ground work already done here at Reading, and with a large modern airport for a stage, what are we waiting for? Reading is willing; why not use what we have started?

Alfred M. Bertolet, Pres.
Reading Aviation Service.

To the Editor:

Let's have a National Civil Air Show. The public is tired of war demonstrations, tired of War period. At the show here in Philadelphia, the civilian pilot turnout was very poor. As for the public, it was even worse, and there was no place to park, so please don't have it here. Give it to an air-minded city in the Midwest; they will push it.

R. Parsons, AAL



"Take it from me, George... the safest engine is a clean engine... and there's no cleaner engine than a Gulf-lubricated engine!"

Use new Gulfpride Series D, the detergent oil, or Gulf's Aircraft Engine Oil, the straight mineral oil. Either way, you'll be keeping your engine clean, and playing it safe.

Not only do Gulf's oils lubricate engines thoroughly and efficiently. They also keep engines clean.

That means increased periods between engine overhauls, because of less wear and tear on engine parts.

Gulf's Aircraft Engine Oil is the finest straight mineral oil you can choose—keeps engines as clean as any straight mineral oil can. But for the greatest possible cleanliness, buy Gulfpride Series D, the detergent oil.

Gulfpride Aviation Oil—Series D. Detergent Oil—for greatest possible cleanliness in radial, inline and horizontally opposed engines.

Gulf Aircraft Engine Oil—Straight Mineral Oil that minimizes sludge and oil inlet screen deposits, keeping your engine clean and safe.

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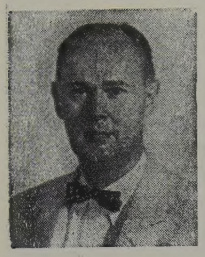


NBAA Director's Notes

● Charles A. McKinnon, Mgr. of flight operations, International Business Machine Corp., has been selected to join the Society of Automotive Engrs. Cockpit Standardization Committee S-7.

Announcement of his appointment was made by M. G. Beard, Chairman of the SAE S-7 committee which is composed of aviation industry members devoted to improvement and standardization of aircraft cockpits.

Mr. McKinnon is NBAA representative for IBM, a graduate of Georgia Tech and a former UAL Capt. He has headed the IBM flight operations since Jan. '54.

"All of the specifications," Mr. Beard pointed out in his letter of invitation to NBAA to participate in the SAE Committee, "for the new transports in corporate requirements are in adherence to SAE S-7 documents . . . The Corporate fleets were some of the first to adopt these documents for use in their executive transports. . . . This branch of industry should be represented on the Committee S-7."

● As a result of NBAA's requests, CAA now has allocated more funds to their Statistical Div., enabling them to make more complete surveys on extent of business flying. For past 2 yrs. business flying figures were obtainable, for most part, only through independent research conducted by manufacturing groups and associations.

● Selection of Phila. for site of NBAA's 11th Annual Meeting in 1958, has been announced by NBAA Board of Directors. Local NBAA committee headed by Bob Morrison, Insurance Co. of North America Companies, surveyed hotel sites and approval was given to Bellvue-Stratford. Dates: Sept. 22-23-24. THAT'S 1958: DENVER IS 1957 MEETING, October 2-3-4.

● *ANTI-COLLISION LIGHTS*—two versions are making flight demonstrations around the country. Both use high-intensity, flashing, blue-white stroboscopic lights. Atkins system blips lights in three zones—forward at 160 flashes per min., to the side at 80 and to the rear at 40. Madsen system uses "ripple" effect with lights flashing in sequence from tail to nose and are visible from 360-degrees.

Both systems emphasize that traditional red danger lights are of comparative low visibility . . . even when flashing or rotating.

● The number of incidents involving conflicting ATC clearances which result in two aircraft being cleared at same altitude to cross the same fix at the same time has caused many letters to be sent by pilots to CAA and to the ATC regions involved.

NBAA has raised the problem to CAB officials: What standardized procedures can be recommended for pilot action when such a conflict becomes known to the pilot? Can a general advisory rule be made which will cover the infinite number of possibilities of conflicts involving descents, climb outs and crossings?

Your comments will be appreciated and used to advise CAB . . . let's hear from *you!*

● *EXECUTIVE TURBO-PROPS* . . . new entries in the field include Grumman and On Mark. Third entry by another old-line airframe manufacturer may be announced soon. Grumman, it is reported, has their design in mock-up stages now. On Mark, previously noted for executive B-26 conversions, plans their model for middle of 1958.

● *HULL AND LIABILITY INSURANCE* premium rates for aircraft have increased in the past months. Premium rate rise due to insurance companies' realistic look at their own competitive market which, they state, forced premium rates to exceptionally low levels. Business flight safety record in 1956, preliminary figures indicate, was improvement over previous years.

NBAA Membership

Information regarding regular or Associate Membership in the National Business Aircraft Association is readily secured by writing to the Executive Director and Secretary of NBAA at 344 Pennsylvania Building, Washington 4, D.C.

Membership in this non-profit and independent aviation organization is based on the recognition of business flying problems common to all users of aircraft for their business purposes and to those engaged in supporting the operation, servicing, equipment, and manufacture of business aircraft.

Among the fields in which NBAA is concerned are: improvements in airways and airports, better weather service, expansion in communications and air navigation facilities, higher standards of airport services, improved aircraft parts distribution, equitable tax rulings for business aircraft operations, greater recognition of the airplane as a necessary tool in modern business and industry, better air traffic control procedures, professional status for qualified business pilots, and aircraft designed to meet the special requirements of business flying.

Suite 344

The March Board Meeting of your Association was held at Suite 344 on Fri., Mar. 29. Those present: Joseph B. Burn, NBAA Pres., representing Fuller Brush Co.; Ralph E. Piper, Monsanto Chem. Co., NBAA's Chmn. of the 1957 Awards Comm.; Jim Ketner, Texas Eastern Transmission Co., NBAA's Chmn. of Regional Organization Committee.

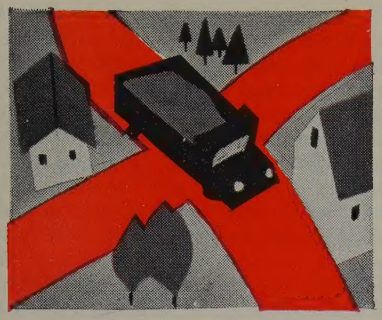
On behalf of the membership, NBAA welcomes the new members accepted by the Exec. Committee: H. E. Millard Lime & Stone Co., Annville, Pa., Regular Member, Chas. C. Dwight NBAA Rep. and Chief Pilot, E. D. Williams, Vice Pres., in charge of Aviation activities; Viemeister Assoc., Inc., Lindenhurst, N.Y., Associate Member, P. E. Viemeister, Pres., NBAA Rep.; Missile Systems Div., Lockheed Aircraft Corp., Van Nuys, Cal.; Associate Member, Rex Hardy, Jr., Pilot, NBAA Rep., G. A. Pedersen, Engr., Aircraft Operations Dept., in charge of Aviation activities; Aircraft Owners & Pilots Assn., Bethesda, Md., Associate Member, Max Karant, Vice Pres., NBAA Rep.

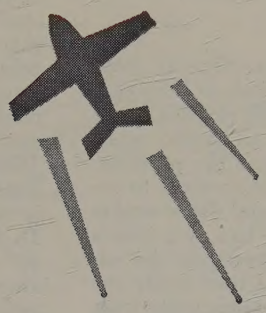
Notice to NBAA Representatives: It is time to get your log books together for total mi. flown during the new fiscal year, for those companies that have flown 1 million or more consecutive accident-free plane mi.; and those pilots who have flown 500,000 or more accident-free plane mi.

Mailings for April: Pres. Eisenhower's Message to Congress urging the establishment of an Airways Modernization Bd., and the Interim Report of the Special Asst. for Aviation Facilities Planning, Edw. P. Curtis, outlining the reasons why the Airways Modernization Bd. is needed; and the Bill to provide for the development and modernization of the national system of navigation and traffic control facilities to serve present and future needs of civil and military aviation; Review of CAA Proposed Airworthiness Directives; Resume showing how the cuts made in the House of Representatives will affect your business flying by eliminating sorely needed Weather Bureau personnel and facilities; Reprint of a special report for Champion Spark Plug Co., Toledo, O., entitled *Operation Business Flying*, by Herb Fisher; Application and booklet of rules and regulations of the Women's Aeronautical Assn. of Wichita, Kan., for the 3rd Annual Award to be given at NBAA's 10th Annual Meeting.

Among other outside activities before legislative groups, your Executive Director spoke before the Phila. Section of the Inst. of Aeronautical Sciences on *The Five "W's" of Business Aircraft.* The five "W's": *who* flies them; *where* they go; *where* they are needed; *what* economic value; *why* they are important to U.S. industry. He attended the Spring Assembly of the RTCA/IRE in Los Angeles, and during this time visited NBAA members in Cal. Bill and his

(*Continued on page* 36)





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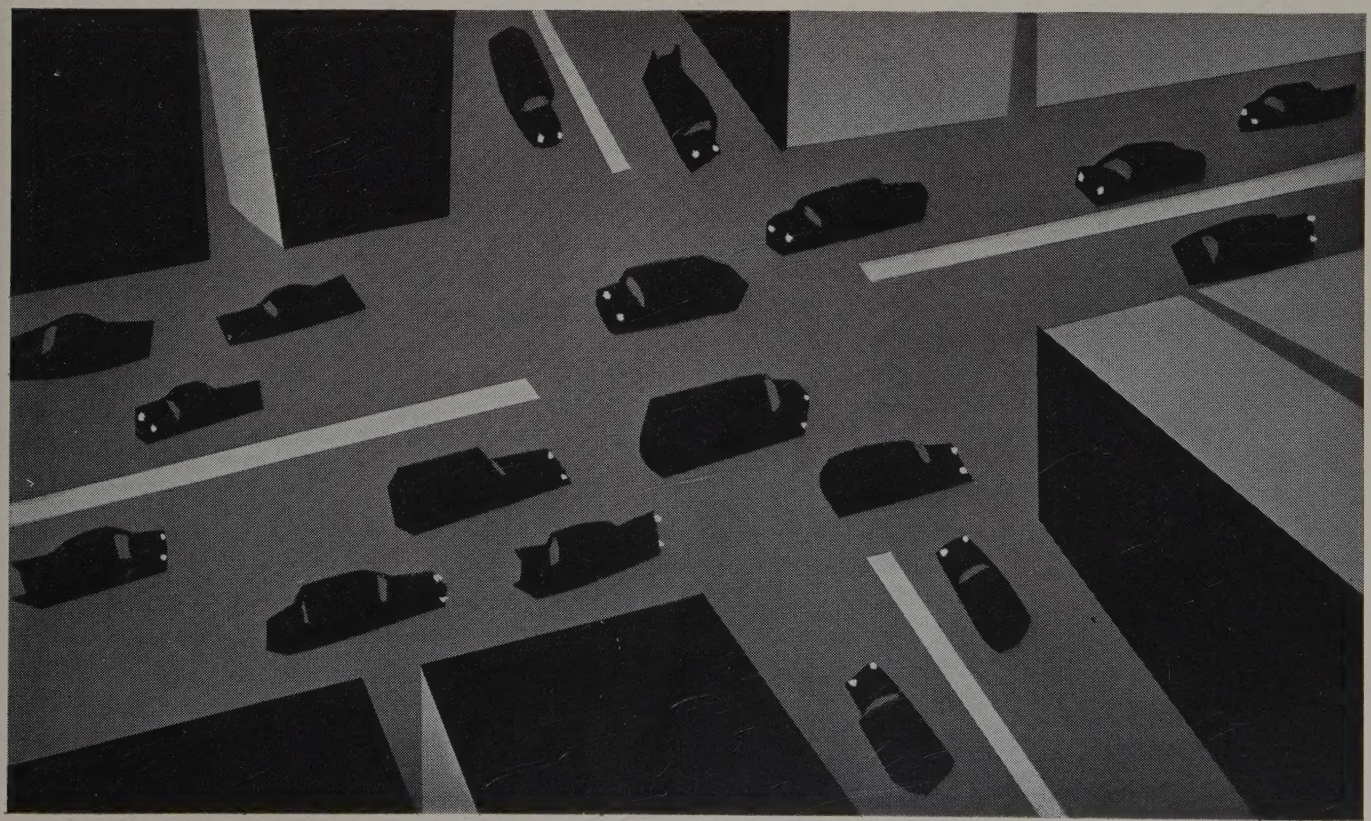


The use of jets in Business Flying no longer presents insoluble problems in operations. The remaining fly in the ointment is

JET NOISE

Thomas M. Love

Lt. Col., USAF

We know that jet engine noise is one of the hottest subjects in military and civilian aviation circles today. Both military and civilian aviation are pushing jet engine noise abatement programs for similar reasons; namely:

1. To prevent ear and nervous system injuries to maintenance crews. 2. To promote greater efficiency in aircraft maintenance, ground servicing, and other airport operations. 3. To prevent both ground and flying operations from interfering with the normal living environment in surrounding or adjacent communities.

Of course, civil air carriers have one more very important reason to reduce noise. They can't afford empty or scarcely populated terminals! However, all of these problems have rational solutions, as we shall see. Reason No. 3 is the most touchy issue of all, for adverse community reaction—or the fear of it—has led to the absolute denial of certain airports for jet aircraft operations. People living in nearby communities will not suffer ear injuries. At worst, they will suffer the nuisance of the noise. We humans are peculiar in this respect. We no longer notice the 90+ deep throated decibels when big diesel trucks cruise through town, nor do we complain when the 5:02 shatters the countryside, burning up the rails. But the public doesn't like this new jet racket. It's new and it's loud. To add to the complications, busy airports seem to collect communities just as a magnet draws iron filings. Sooner or later, these communities object to air traffic noise.

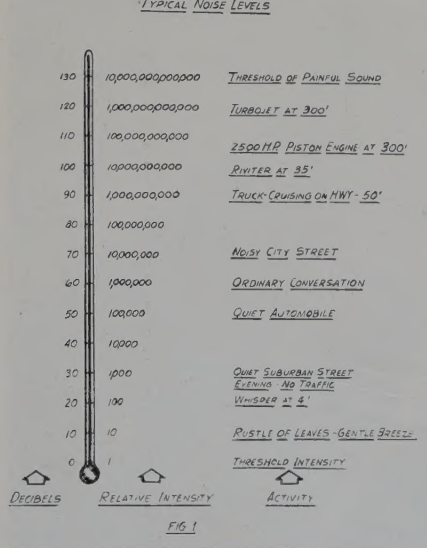


FIG. 1

There are two facets to the problem. The first is to find effective ways to reduce jet engine noise; and the second is to find the best ways to live with what's left. But first, let us investigate the nature of noise itself, and then study the characteristics of jet engine noise from a sampling of a jet aircraft. *Fig. 1* is a noise scale ranging from 0 to 130 decibels, with the activities that produce noise listed opposite the decibel scale. The top reading on the scale denotes the threshhold of painful sound. While this chart hasn't reduced all readings to the same distance parameters, it does reveal that a high level of noise has become a normal environment. *Fig. 2* illustrates noise criteria and the upper limits of noise that can be tolerated by the human ear. The ear can tolerate low frequency sounds better than high frequencies, and a jumble of frequencies (wide band noise) better than noise concentrated in narrow frequencies (pure tones).

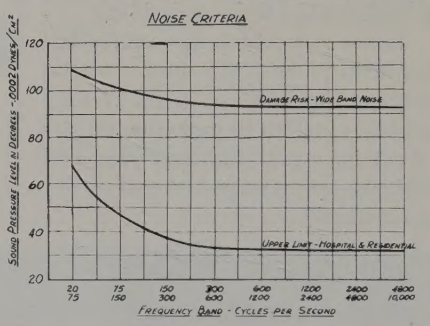
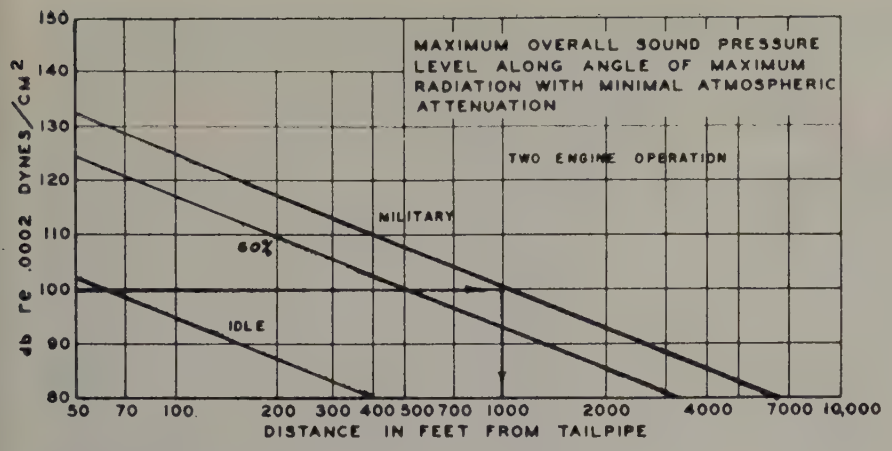
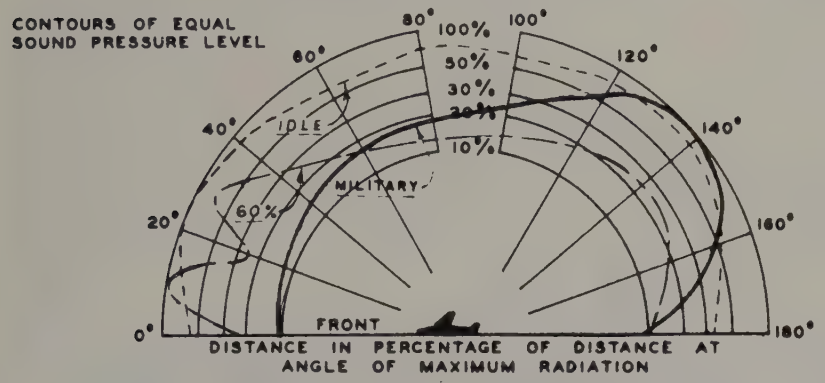


FIG. 2

Now for some specific jet aircraft noise characteristics. *Fig. 3* is a noise characteristic chart for a light jet trainer. This chart was prepared for the Air Force by the Wright Air Development Center of the Air Research and Development Command. This and other specific aircraft noise charts are used with a separate table to determine noise danger areas for maintenance personnel during engine run-up and trimming operations. The table lists the maximum length of time that ground crew members may be subjected to various noise levels, using different types of ear protective devices. Only half of the noise chart is plotted, since the noise patterns are symmetrical about the longitudinal axis of the aircraft. The lopsided curves are contours of equal sound pressure levels. The dotted curve passes through points of equal sound intensity at 60% throttle; and the solid curve represents the military or full throttle noise pattern. Let us now solve a simple problem of finding several radial distances about the aircraft where an observer will be subjected to 100 decibels (100 db) under military power condition. First, use the upper chart and note where the 100 db line intersects the military power curve. Reading down from this intersection to the distance scale you will find that it is exactly 1000′. Now, using the lower, polar chart you will note that the military power sound pressure curve reaches maximum percentage distance circle (100%) along the 140° radial. This means that at 1000′, along the 140° radial, an observer will be subjected to 100 db (100% times 1000′). To find the 100 db distance along the 40° radial (40° off the nose of the aircraft) you will find that the military power curve intersects a 15% circle (half way between the 10% circle and the 20% circle). Therefore, the 100 db distance along the 40° radial is 15% times 1000′, or 150′. In a similar manner, all distances around a jet aircraft can be plotted for any db level that the engine generates. Comparing the noise curves of the light trainer with those of other jet aircraft—single or multi-engine—will reveal a rather startling fact: the maximum, or military power curves are strikingly similar. They all look like full race grind cam lobes, pointing in the vicinity of the 140° radial. The noisiest area isn't directly aft of the tail pipe. Instead, for any jet aircraft, it's in the general vicinity of the 140° radial. Of course, the acoustical experts will probably sneer at this generalization, but it's close enough for the ears that you and I wear. The idle sound pressure curves may vary, depending on engine type and intake duct configurations. Don't get the idea that all jet aircraft have the same noise intensity. The point here is that all have similar noise *patterns*. This chart does not consider the frequency spectrum; that is, the frequency bands for various power settings. This is a very important consideration, so we may add a final basic characteristic of jet engines. At idle rpm they whine in the high and narrow frequency bands (pure tones)—while at full power they become deep throated with a variety of frequencies (mixed frequencies).

Now that we have identified the fundamental characteristics of jet noise, let us proceed to the question: What can be done to reduce jet noise? Well, there are two facets to this problem. One is to reduce jet noise during ground maintenance and run-up operations; the other is to reduce noise during actual flight operations. This principally concerns take-off, climb, descent, traffic pattern flying, and landing, since Mr. John Q. Public doesn't have any





OVERALL LEVELS AT SPECIFIC MAINTENANCE POSITIONS

POSITIONS	TWO ENGINE OPERATION*		
GENERAL AREA	IDLE	60% RPM**	MILITARY
	118	129	129
WING TIP	109	120	124
BENEATH ENGINE		128	131
COCKPIT, CANOPY OPEN	118		
5' OUT FROM INTAKE	122	133	128

*ALL LEVELS ARE AVERAGE LEVELS
**SPECTRUM SIMILALAR TO THAT AT IDLE

FIG. NO. 3

objection to the silent contrail.

The noise generated by ground power checks is considerable, as even the noise diagram for the jet trainer reveals. First, an engine run-up area should be selected that minimizes the disturbance to not only the populated areas of the airport, but also the populated areas of the adjacent community as well. This will be a difficult problem at most airports, but there is bound to be one location that is better than all others. The use of an engine muffler at the selected location will produce maximum results. Hence, noise reduction for ground run-up operations involves the proper selection and orientation of an engine run-up area, coupled with muffled engine operation. *Fig. 4* and *Fig. 5* compare the effects of distance, weather, shielding, directivity, etc., on noise generated by jet aircraft. Some of these methods, used in combination, will further reduce noise levels. Jet engine mufflers cover a wide range in both complexity and cost. For instance, the jet engine test cells at overhaul depots are huge and expensive structures, but they do the job most effectively. A large jet engine can be screaming under full power in one of these test cells, with only a slight "whoosing" sound being heard several blocks away. However, this "all-out" noise suppression comes at a high price. Relatively simple and economical mufflers can be built for routine ground run-ups at "home base" airports. One type consists of an extended orifice that mates with the engine tail pipe to receive the exhaust gases and deflect them vertically through a long pipe into the air. A minimal baffling chamber is incorporated to obtain the necessary attenuation.

Noise reduction during taxi, take-off, and landing operations is not as straight-forward. It's a new and complex design field. However, Boeing Aircraft Corp. is designing and testing suppressors (noise reducers) that hold pretty bright prospects. *Fig. 6* shows one of the configurations being tested. Boeing states unequivocally that the 707 Jet Transport will incorporate sound suppression devices that will substantially reduce external noise, and the prototype installation will be flying in June. Their immediate goal is to reduce jet noise to the level of piston engine transport aircraft. Of course, airframe or engine mounted mufflers come at a price that must be paid for in weight, drag, and thrust reduction. For this reason, military aircraft cannot afford airframe mounted suppressors. The military flight performance race is stiff enough without introducing handicaps. There is a "radical" solution to the taxi noise problem as it applies to large commercial jet transport operations in passenger terminal areas. The basic idea is this: the attachment of a specially designed nose gear tug—remotely controlled by the pilot—to take the transport from the terminal gate to the run-up area adjacent to the active runway. This tug could be remotely controlled by the pilot through an electrical hook-up (for steering, throttle and brakes) between the tug and the aircraft. A safety observer would attach the vehicle to the nose gear strut and ride on the tug to the starting area. He would then disengage the tug, act as fire guard during the jet engine starting operation, and drive back to the terminal. The savings in fuel alone makes this approach well worth investigating—and the "big birds" burn lots of it during taxi operations. In addition to the fuel savings, the silent movement of the jet transport from the terminal area would put the piston engine aircraft to noisy shame.

As for the climb-out, traffic pattern, and landing approach noise, there are techniques that can be used to minimize these disturbances to communities. In this regard, the NACA has published Technical Note 3582, dated 15 Jan. 1956, titled: *Effect of Climb Technique on Jet-Transport Noise.* This Technical Note explains pilot techniques that will minimize the jet noise disturbances during take-off and climb operations. The same principles can be applied to any jet aircraft, and in particular to the executive jet transport. The findings and conclusions stated in TN 3582 are too detailed for restatement in this article; but the information is there for those who are interested.

Living with the noise that can't be suppressed is largely a matter of horse sense. Choosing the right runway can

(*Continued on page* 36)

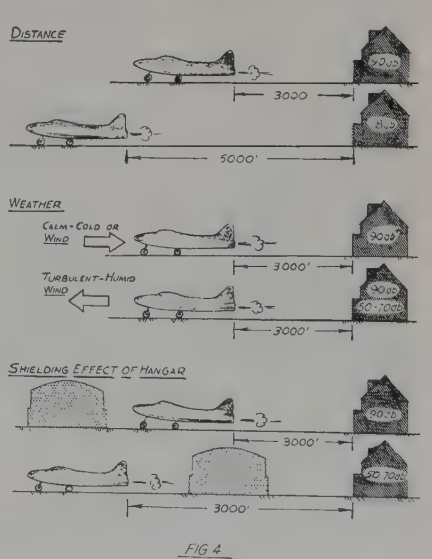


FIG 4

BEECHCRAFT TRAVEL AIR ILLUSTRATED

SR-83P
ILLUSTRATED

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TREES + PLANE = $

Christmas tree "farming" by airplane is one unusual aspect of the steadily increasing use of aircraft for agriculture and lumbering.

The variety of enterprises facilitated by the use of business aircraft is impressive and sometimes surprising, even to people aware of the great contribution made by business aviation. However Roy Halvorson, President of Halvorson Trees, Inc., is convinced that nothing can beat an airplane when it comes to keeping tabs on 14,000 acres of Christmas trees, and the all-around versatility of business aircraft has proved so valuable to him that he has recently acquired his 3rd plane, an Aero Commander.

"It is easy to remember our first introduction to the airplane as a recognized asset in our Christmas tree business," says Roy. "The incident stands out clearly in my memory, for hardly a week passes now without some reminder of the long-range benefits received as a direct result of those first flights."

His introduction to business flying occurred when it became essential for him to survey some 3500 acres of land, remote and inaccessible, but covered with good spruce trees, that would within a short time become the property of the state of Minnesota. It was essential that a decision be made quickly, but the job of surveying the land on foot in mid-winter was tough and expensive.

Several days' flying in a chartered Taylorcraft gave Halvorson Trees all the information needed to purchase the tract. The aerial survey proved to be substantially accurate, and the plane had proved so valuable that, as Roy says, "The first aerial survey proved only the beginning, for much of our present 14,000 acres of fine spruce forest was located first through our aerial surveys."

Roy was so impressed with the value of flying that he persuaded his wife and 17-yr.-old daughter to join him in taking flying lessons. With 3 in the family flying, the purchase of an airplane was a quick and logical step.

The first plane was a Stinson Voyager 150, and it immediately proved invaluable for business calls in all major cities and a continuous round of aerial surveys, photographic expeditions, fire patrols, water-level patrols and countless other missions.

One of the characteristic problems which could not have been uncovered properly by foot-work but which was quickly spotted from the air was the inundation of thousands of acres of spruce forests in northern Minnesota caused by beaver dams, which raised the water table, killing all the timber flooded. In the comparatively level country in which black spruce grows, uncontrolled beaver activity can flood several square miles with several feet of water.

Conservationists in the Game and Fish Departments opposed Halvorson's request for more strict control of the beaver population, but he finally proved his point by flying over the devastated area and taking color photographs of the expanses of dead timber. The pictures, turned over to the Conservation Commissioner, were so impressive that he revised game laws to prevent further ravages.

Beaver patrol is still such an important part of Halvorson's aerial operations that "The use of the airplane in this application alone has been of inestimable value to us."

The utility of aircraft in such a widespread business enterprise as Halvorson Trees is practically unlimited. The value of aircraft for fire spotting was realized very quickly, and company planes have often been used during hazardous dry spells to fly state rangers over their entire territory in a few hours. Roy reports that *any* trip in northern Minnesota involves some smoke-watching. After a gale or tornado, the Halvorson plane is used for spotting fallen trees. The information is transmitted to various government agencies so that the "blow-downs" can be salvaged for timber before it has decayed. Aerial survey also permits rapid discovery of insect damage, and the mapping out of control measures.

Survey and conservation flights, however, are all preliminaries to getting the trees out of the forest and onto the market. Halvorson normally operates between 12 and 15 cutting crews, and common practice before each cutting season is to fly the foreman, and sometimes part of his crew, over an area which is to be cut. A few minutes' inspection from the air shows the foreman the location of the heaviest concentration of spruce, the location of any roads useful to his starting operation, and many other facts about the particular growth which might take weeks to determine by footwork. The location of old logging roads is particularly easy by air, although they are frequently indistinguishable at ground level.

Halvorson has also found it good employee relations to permit the tree cutters to see the forest in which they will work, and occasionally some of the

(Continued on page 34)

ROY HALVORSON *and his son Tom, who flies co-pilot on the Aero Commander. Halvorson's Christmas tree business involves continual aerial survey of 14,000 acres of forest, watching for fire, insect and storm damage, and mapping for deployment of cutting crews. Halvorson also makes regular business trips all over the U.S., sometimes ranging from Saskatchewan to the West Indies. The Aero Commander is his third plane, replacing a Navion which flew a distance equivalent to nine times around the world.*

Concept of an All-Weather Air Navigation and Traffic Control System

By James E. Grambart

In 1932, before anyone ever dreamed that enough airplanes could be built to create a need for a controlled airway system, not to mention congested areas and hi-density restrictions, an inventor-engineer, John Hays Hammond, conceived and patented a device for aerial navigation and instrument approach, second only to Jules Verne in anticipating the future.

Based primarily on direction finding radio (*not* ADF as we know it today), Mr. Hammond envisioned the use of yet another device familiar at that time only to Tom Swift readers: television. He proposed to locate several DF stations in the vicinity of an airport. In the airplane he placed a fixed frequency transmitter. When the airplane was in the clouds in the vicinity of the field, the radio signal transmitted was picked up through the DF stations and conveyed to an apparatus that was like an early version of a modern computer. This device operated and positioned a TV camera so that it viewed a model of the subject air field and its environs from the apparent perspective of the airplane emitting the signal. The resultant picture was then televised to a receiver in the airplane where it was displayed on a viewing panel for the pilot to navigate and approach by, exactly as though he were flying visually!

Like so many aviation developments of those days, demand was not great enough to encourage development. The idea smouldered in the DCA archives of the patent office. Today we have both the technology and the means to put the plan to work. More important, the need is dire; hundreds of lives and millions of dollars are at stake. The current system of airways is at the bursting point while engineers and committees plan future devices and solutions, some a decade or more away and involving tremendous problems of cost, weight and space.

The system concept integrates two established electronic techniques: radar and television, or TV-Radar. The method of operation is as follows:

A. The radar picture is televised from the ground radar site.

B. The pilot of an aircraft equipped with a suitable television receiver has visual reference to the televised radar display.

C. The pilot, by one of 4 methods outlined below, identifies the target of his aircraft, and so establishes his position by means of the radar map overlay.

At any time, the pilot can identify the target of his aircraft by one of the following methods:

A. Transponder-equipped aircraft. The pilot keys his transponder while watching his TV-Radar for a target marked by his transponder code.

B. Cross-check over a radio fix with the corresponding position on the TV-Radar map overlay.

C. The pilot makes identifying turns while checking his televised radar map for a similarly turning target.

D. When within range of a televised radar installation equipped with VHF Direction Finding (as at Washington National) the pilot observes the electronic cross-pointer display on his televised radar while a VHF-DF fix is made on his aircraft.

Air Navigation

When an airplane is within range of a televised radar network, the TV-Radar can be used both as a primary source of air navigation, and to complement the following cockpit aids: compass; omni receiver; ADF; low frequency range receiver; ILS receiver; DME.

Since the pilot sees his own target progress over the face of the radar map overlay, he has a continuous and positive *pictorial position indication* as to his ground speed, track, and distance to the next check point. Televised radar will provide the parallel system that every pilot would like available in the event of failure of either system. As long as the pilot has his target identified he can navigate by reference to the televised radar scope alone, even though every other electronic navigation aid fails. TV-Radar achieves with one simple and comparatively inexpensive television receiver the *surety of visual-reference pilotage under instrument conditions.*

If the Precision Radar Scope were televised from an airport, the pilot himself could observe and correct the progress of his target along the glide slope and localizer. He would become his own radar monitor, making corrections, when needed, on the basis of first-hand visual observations. The Ground Controlled Approach would become what the pilot vastly prefers, a *cockpit controlled approach.*

Let's examine the matter of the difficult-to-execute circling approach under conditions of lowered ceiling and/or visibility, when the wind will not permit a straight-in approach. During the first part of the approach along the ILS front or back course, the aircraft's path is a safe and familiar track along the Localizer. But at some point on the approach the pilot must turn from that solid and sure Localizer to form a downwind and base leg for the into-the-wind runway. Then he is on his own, visual, but all-too-often not wholly visual.

The aircraft's path will vary with the pilot, his familiarity with the local terrain, and his judgment. One inbound flight will turn from the ILS at the Outer Marker to form a comfortable downwind and base leg. The next may ride the Localizer right up to the Middle Marker or the field boundary, then rack it around sharply in a tight pattern. Neither the pilots nor the controllers favor this situation.

Now suppose that we draw on the video map a curved path off the Localizer to represent an optimum flight pattern for a circling approach. The pilot could then, seeing his target on his TV-Radar, make that target follow the map-scribed pattern, and throughout downwind and base leg the pilot would *know* his position relative to the end of the runway. Again, *the pilot could visually monitor his own approach.*

Proximity Warning Indication

Referring to the televised radar scope of the area through which he is flying, the pilot will have a constant running check on the distance, speed and bearing of potential traffic. Aircraft flying within a televised radar net will, to a large degree, be able to operate on a see-and-be-seen basis in instrument weather.

BOAC operated the Comet 1 on the European-South African routes for almost 2 yrs. before the pressurization failures. During that time the aircraft passed each other in opposite-direction flight over radio fixes several times per week. They had 2000′ vertical separation at time of passing, and were at their optimum altitudes between 38 and 44,000′, almost always on top in CAVU conditions. Although the aircraft were routinely in radio contact with one another, *no Comet ever reported sighting another* at time of passing. The average closing speeds were about 880 mph.

The already ordered jet transports will make possible closing speeds of

(*Continued on page* 37)

Extra Value makes the difference in Aviation Insurance

The Scott Paper Company plane, insured by North America

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Problems of
CREW MANAGEMENT

Capt. W. Karraker

Pan American World Airways

(Ed. Note:) In just the same fashion as many business aviation fleets fell heir to pre-war and World War II transport aircraft equipments, so did they inherit the problems of flight personnel, crew management. Therefore, the experiences and practices developed in successful airline operations may well be germaine to successful business fleet operation. Although most business aircraft operations, even executive transportation, do not alter flight teams as frequently as the large airlines, the basic problems remain, and as larger 4-engine aircraft enter the corporate picture, business fleet operation may more closely parallel airline crew scheduling.

Some of the problems of those who manage airline flight crews are inherent in the organization and scheduling of such crews. Currently the basic flight crew is assembled at a crew base, assigned to a trip, and dispersed at the end of each round trip. Such dispersal creates or intensifies some of the problems of flight crew management with which we shall deal.

In this article I am concerned only with those problems which relate to the crew-at-work; meaning the crew that has been assembled, and that has left its base. I shall not touch upon hiring policies, at-base management, or record keeping.

Problems of flight crew management may be allocated to four general categories; those relating to (1) flight safety, (2) flight service, (3) flight efficieny, and (4) employee satisfaction.

As a human group, in the usual sociological meaning, flight crews can be studied much as other small groups have been studied in other industries, and as have air crews in the U.S. Air Force.

The *captain* is in command of the aircraft, and is answerable to his company's management in the person of a chief pilot or flight manager for the safe, efficient, and otherwise satisfactory conduct of all flights to which he is assigned. His work very much resembles that of a foreman in industry in that he supervises no one who supervises anyone else. However, he has no power to "hire and fire", as most foremen have, and he rarely has entirely the same work force on successive trips.

The *copilot* is second in command, and assists the captain with all pilot duties. He reports to the chief pilot in general, but in particular to the captain of each flight to which he is assigned.

The airline *flight engineer* (copilot-mechanic responsibility in some smaller corporation crews) is responsible to the captain of each flight to which he is assigned for assuring airworthiness of the aircraft, the loading of fuel and other fluids, the condition of emergency equipment, and the operation of engines and other systems in flight. He reports *to the maintenance section of* Operations.

Cabin attendants are still a rarity in business fleet operation.

Flight Safety

It is axiomatic that safety must be the prime consideration if any system of flight crew organization is to be instituted or maintained. Prof. Kenneth Andrews of the Harvard Business School, addressing the Bermuda Flight Safety Seminar of the Flight Safety Foundation, went so far as to say, "Every accident, no matter how minor, is a failure of organization." I venture to suggest that the staffing of an aircraft by an aggregate of individuals who have trained as individuals—never as a team —is "organization for disaster".

A recent example (Accident Investigation Report, CAB, File # 1-0109) indicates the validity of the foregoing statement. A DC-3 crashed at Burbank, Cal. The CAB said in its opinion, "This was Captain B———'s first takeoff with Copilot D———. . . . When the malfunction occurred, the captain may have considered his altitude insufficient for safe transition from visual to instrument flight, *or for reliance upon his copilot for much, if any, help on this their first flight together.*"

Consider too the more recent case wherein a copilot being checked for promotion to captaincy pulled back a throttle on takeoff due to a fire warning indication (not seen or heard by the check captain), and thus disarmed the auto-feathering system, producing a "windmilling" propeller, excessive drag, and a crash. His action was appropriate for one purpose, but he was prevented from feathering the propeller manually by order of the check captain who was conducting a different procedure which he felt to be warranted by his conception of the emergency.

The CAB determined, ". . . the probable cause of the accident was uncoordinated emergency action in the very short time available to the crew. . . ."

It is noteworthy that the crew in this instance consisted of a check captain (acting as copilot) and a senior copilot (acting as captain) both of whom could be presumed to have been well trained and experienced in standard procedures. Changes were made in the procedures as a result of their inadequacy in this case.

In 1955 a DC-3 crashed after hitting a power line during an attempted "go-around" from an aborted landing. According to CAB Accident Investigation Report, File #1-0077, ". . . Capt. T—— advanced the throttles to takeoff power and a go-around was started with the aircraft becoming airborne at 70 knots IAS. . . . as the aircraft passed the south end of the runway at an altitude of approximately 25′ and an indicated airspeed of 78 knots he (the captain) ordered 'gear up'. Instead of raising the gear the 1st officer pulled both throttles back to the closed position.

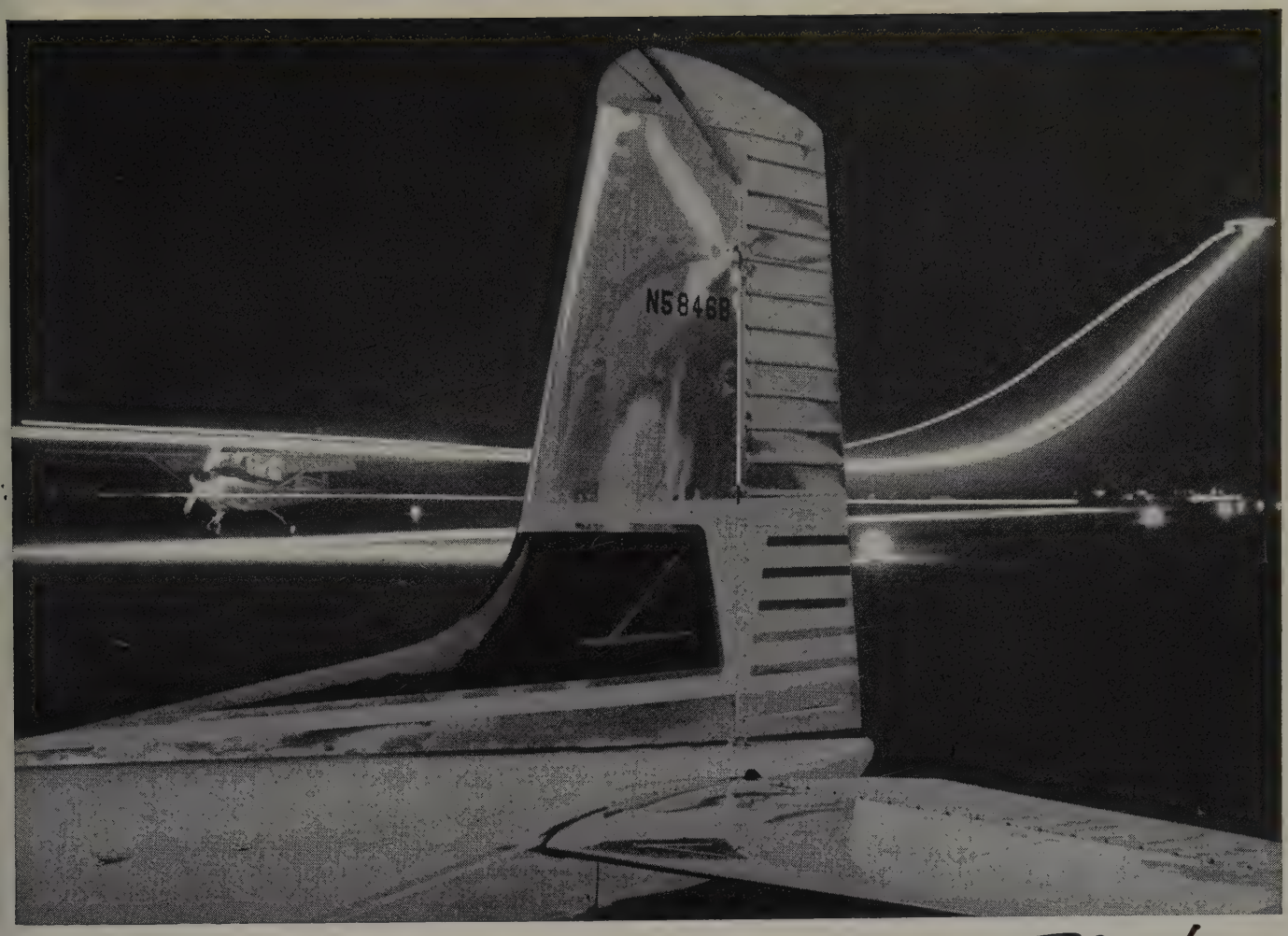
"First officer C—— testified that he was not advised of the go-around and that the order for gear up was the only thing said by the captain after power was applied and the go-around was started. In accounting for his action of pulling the throttles back, his testimony was, 'At the time the command was given I was expecting an order to reduce power, and inasmuch as it looked like a crash was inevitable, when the order came I moved them by spontaneous action.'

"Since his recall to N—— Airlines, First officer C—— had flown three round trips over the route with Captain T——."

In this case something blocked the co-ordination within a crew of two men, even though they had flown together 3 times during the year preceding the accident.

In the 18 Mar. 1955 issue of *The Aeroplane*, a Canadian publication, a brief article entitled "The Responsibilities of a Second Pilot" contains a description of an accident which occurred when a captain, flying an ILS approach, descended below established minimum altitudes, both at the outer marker and before establishing visual reference to the ground. The First Officer called these infractions of regulations to the Captain's attention during the approach by hand signs. The Board of Inquiry recognized the First Officer's dilemma, and said, ". . . the first officer has some hesitation in interrupting the captain to say or do anything which might be taken as a criticism of the performance of the captain. Particularly is this the case when the captain is involved in concentrated flying, as during an ILS approach, and it is believed that many 1st officers have been reprimanded for

(*Continued on page 31*)



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Only the Cessna 182 in its class delivers top or near top performance in all ways: short take-off . . . fast high climb . . . long range . . . slow rate of descent—and it costs less than any other plane in its class.

And for 1957, this all-round best airplane wraps it all up with a brilliant new flair in design!

You'll see a new inches-lower silhouette with the look of motion in every line. It makes this great new 182 easier than ever to handle . . . on the taxi strip, down the runway, into the air!

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You'll see a new kind of cabin styling . . . a sleek, unhampered look featuring new comfort-recessed front seats, big new high-backed rear seats—plus luxurious new fabrics with textures and colors galore! New, more functional instrumentation. New, automobile-easy parking brake. Even new door closures for quietness.

The dramatic new Flair Flight Cessna 182 is priced (with std. equip.) at $13,975, f.a.f. Wichita. See and fly it now at your Cessna dealer's—Yellow Pages of phone book—or write CESSNA AIRCRAFT CO., Dept. S-8, Wichita, Kansas.

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Airways Facilities of the Future

GAFPG system offers lateral separation of aircraft with vertical separation by speed class.

For the first time in aviation history, 11 organizations, devoted to one phase or another of civil aviation, have voluntarily pooled their financial and experience resources to present a dynamic picture of civil aviation as it is today, and as it will be in the foreseeable future.

To present their side of the story to Edward P. Curtis, Pres. Eisenhower's Special Asst. for the Aviation Facilities Planning Group, in direct competition with the already established and influential military aviation and airline legislative blocs, the General Aviation Facilities Planning Group has compiled an impressive array of facts and figures.

By 1976, the general aviation fleet will be comprised of 90,000 aircraft flying some 20,000,000 hrs., of which more than half, or over 11,000,000, will be devoted exclusively to business flying.

All of the larger multi-engine business aircraft, plus 80% of the light twins and more than 50% of the single-engine business planes, are equipped for full IFR flight.

A larger percentage of the multi-engine business planes are expected to be turboprops by 1976.

Although only 20% of 1956 general aviation flying was non-business flying, the total flying hours were 3 times that of all the airlines, by a fleet 40 times as large as the airline fleet.

The mass of related data accumulated in the GAFPG survey is available to anyone in the general aviation market.

How will the ATC system planned for readiness by 1967, as envisioned by the Systems Engrg. Team of the Office of Aviation Facilities, affect this tremendous aviation fleet?

The System Engrg. Plan, recently made public, sets a basic premise that there shall be equitable distribution to all users of air space.

The operational requirements of the future air traffic control plan are based on an integrated facilities system supporting both civil and military aviation. The system will assist the U. S. Air Defense Command by transmitting information on friendly aircraft to the ADC. It shall be the common Army-Navy-Air Force system in time of war, and the ADC shall provide information on aircraft positions to the system.

The operational objectives of the plan are to:

Increase the capacity of the Air Traffic Control System.

Increase the safety of Air Traffic Control.

Permit the use of any desired tracks or routings selected by the pilot.

Keep costs of the systems at a figure which will not seriously increase the cost of aircraft operation to the owner.

Provide a single traffic control authority for all aircraft.

Use air traffic control techniques that offer minimum potential use to enemy aircraft.

How will these objectives be met, and how will Business Aircraft operate under these new plans?

The Systems Engrg. Team envisions 2 basic systems, each one of them available to any aircraft whose performance and whose pilot-capabilities meet the requirements of the particular system.

One is an all-weather system whereby all traffic will be under control of the system under all types of weather conditions. The second is called the Dual Mode, closely parallel to our present IFR and VFR traffic regulations.

Under the all-weather plan, every aircraft in the designated volume of airspace reserved for all-weather operations will be under direction of air traffic control. Minimum instrumentation, the plan states, would require: 2-way radio communications on appropriate frequencies; a navigation capability of known accuracy; an accurate barometric altimeter.

It is forecast that the all-weather zones would extend approximately from 18,000′ to 20,000′ and upward, and will also provide protected sloping airway space down to the airport surface.

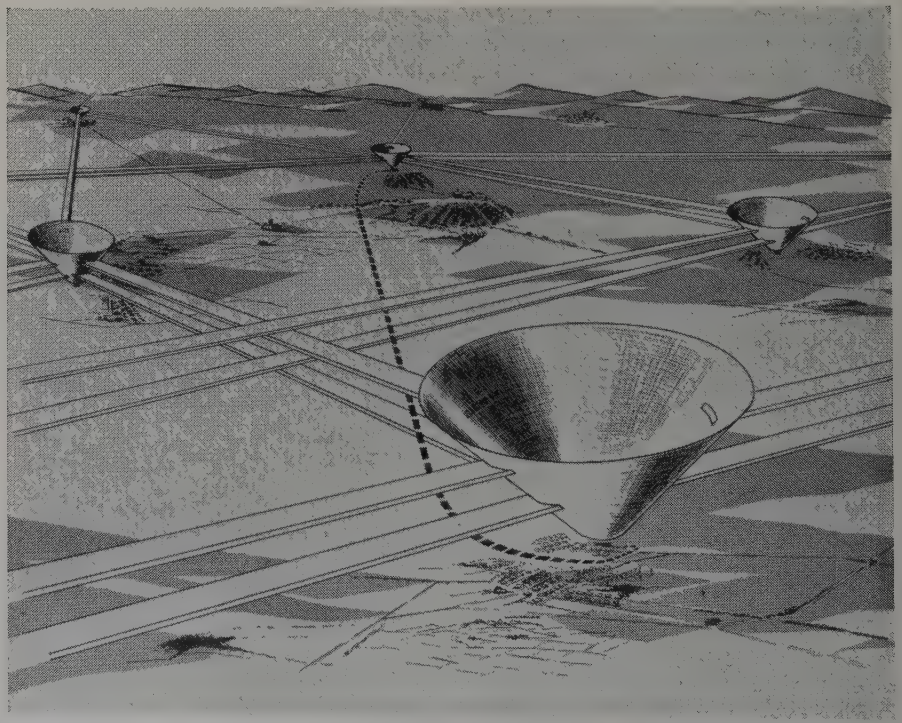
Under the all-weather system, the business pilot will have to: make position reports; have instrument flight capability; be able to follow directions for holding maneuvers. Private pilots without instrument ratings would be permitted to use the controlled airways in VFR conditions.

Under the Dual Mode method, aircraft engaged in off-airways uncontrolled flying would have to meet 2 criteria: a certain designated standard of cockpit visibility would be necessary, and they would have to operate below a maximum speed determined for safe visual separation, probably 200 mph. A warning signal would automatically indicate to the pilot that he had strayed into controlled airspace.

Collision avoidance will be conducted under the present "see and be seen" VFR rules. Weather avoidance must also be adhered to under the VFR section.

If the pilot encounters weather he may transfer over to IFR flight plan rules, if he meets the IFR provisions,

(*Continued on page* 42)



GAFPG *concept offers systematic integration of low-level IFR traffic on airways and off-airways VFR traffic. The "Funnel" above the airport is the proposed holding area, directly over the airport rather than off to one side. Aircraft will come down the airways as indicated into a block of airspace in the funnel and descend to the airport. High-altitude flights will fit in via "step-down altitude blocks" provided enroute to the airport area. The dotted line shows how VFR traffic can be fitted into this concept.*

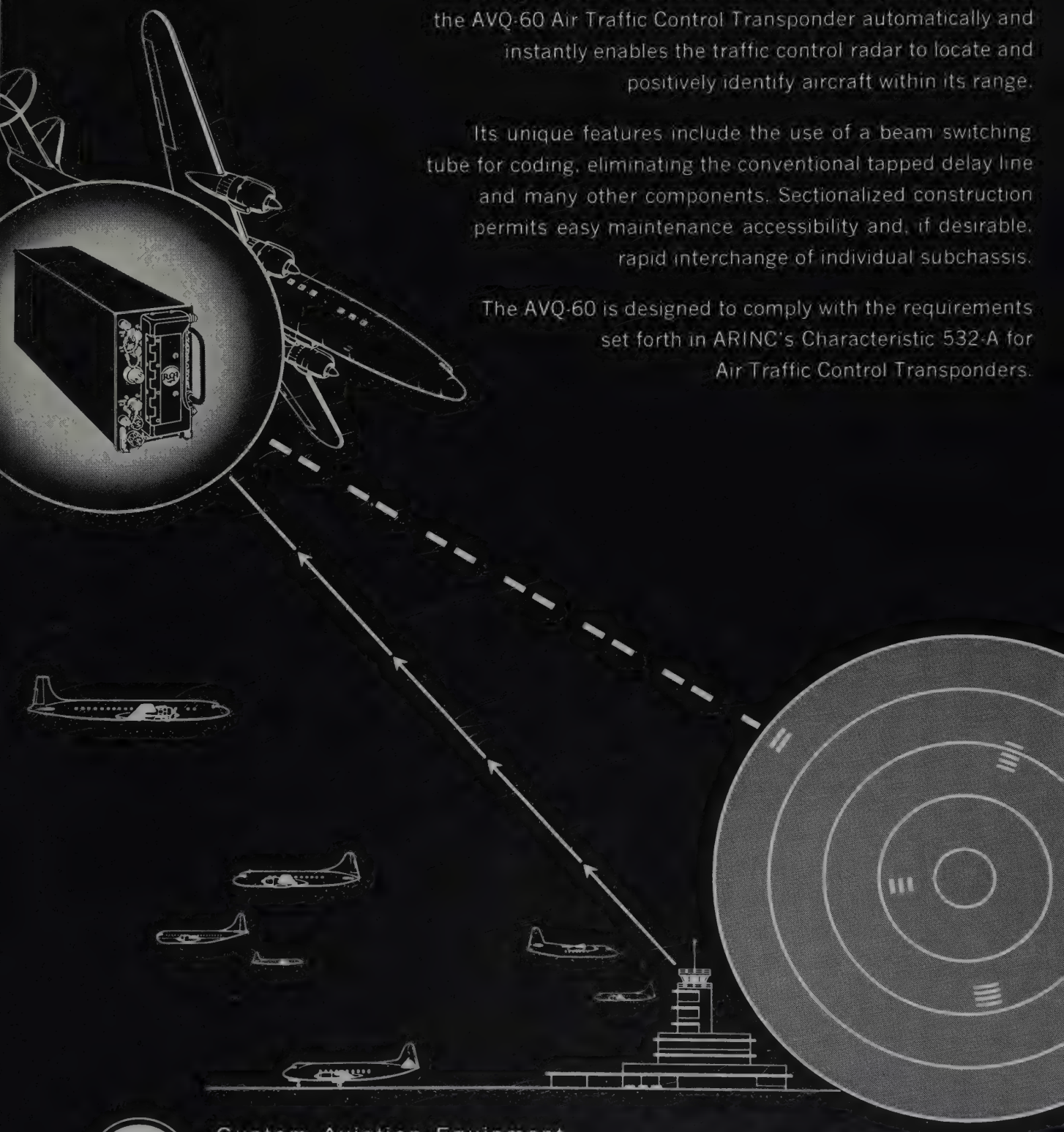
RCA ANNOUNCES . . . THE

AVQ-60 AIR TRAFFIC CONTROL TRANSPONDER

Designed for airline, business, and military transport use, the AVQ-60 Air Traffic Control Transponder automatically and instantly enables the traffic control radar to locate and positively identify aircraft within its range.

Its unique features include the use of a beam switching tube for coding, eliminating the conventional tapped delay line and many other components. Sectionalized construction permits easy maintenance accessibility and, if desirable, rapid interchange of individual subchassis.

The AVQ-60 is designed to comply with the requirements set forth in ARINC's Characteristic 532-A for Air Traffic Control Transponders.



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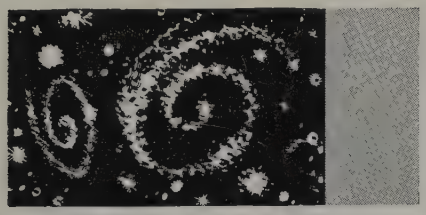


Today, it's the conventional engines for fixed wing and helicopter equipment — R-1820, R-1830, R-1340, R-985, R-2000, R-2800 CA and CB, R-3350, R-4360, Lycoming and Continental engines. Tomorrow, it will be the jet and the turbine engine.

In preparation for this day, Dallas Airmotive will continue to grow and improve its engine methods.

Engines—regardless of type or kind — can best be overhauled at Dallas Airmotive.

Member National Business Aircraft Association

. . . . in the business hangar

■ Southwest Airmotive, Dallas, announces an engine exchange dealership program to make SAC-overhauled powerplants available through 12 participating fixed base operators. Participants include: Aircraftco Inc., Wichita; Aircraftsmen, Inc., Oke City; Alamo Av., San Antonio; Butler Av., Chicago; Cutter-Carr Flying Serv., Albuquerque; Engle Flying Serv., Bristol, Pa.; Northern Air Service, Grand Rapids; Page Airways, Rochester; Pan-Air Corp., New Orleans; Topeka Aircraft, Topeka; Tulsair Distributors, Tulsa; Skymotive, Inc., Park Ridge, Ill. Other dealer appointments in future. SAC reported ready to ship a newly overhauled engine within 3 days after request from one of these dealers; dealer must trade in to SAC an engine from a Twin Beech aircraft. R-985 Wasp Junior most popular exchange engine, is used in new production Beech planes.

■ Spartan Aviation Service Div. recently completed installation of their new Jet Exhaust System on Northern Natural Gas Co.'s newest Ventura.

■ Northwestern Aeronautical Co., St. Paul & Mpls., Minn., announces removal of their aircraft maint. facilities to a new hangar at Wold Chamberlain Field, Mpls. The St. Paul plant continues to overhaul AF R985's, 1820's and components, will continue to do limited airframe work on Minn. Mining & Mfg. fleet based at St. P. □ Recently completed installation of 2-shot CO^2 system, fuel shut-off valves, and fire-detection system on Mpls.-Honeywell DC-3. □ Completed routine 100-hr. inspection and installation of Transair wheel-well door kit on Mpls. Star & Tribune DC-3, Bud Mitchell, Pilot. □ Harry Nystrom brought Gen. Mills DC-3 in for routine 100-hr. inspection and installation of Atkins Anti-Collision lights, mounted on wing tips and fuselage, and installation of experimental rear-view mirrors. □ Pilot Harry Dawson and Co-Pilot Massey brought Rockwell Spring & Axle's DC-3 in for complete exterior paint job and change of control surfaces.□ Olin Mathieson plane in for 100-hr. inspection; Ron Baker is Pilot.

■ Van's Air Service, Winona, Minn., has completed the 24th 100-hr. inspection on the Aero Commander operated by NBAA Member Ray-O-Vac Co., and has installed the 3rd set of majored engines. □ Engine overhaul and 100-hr. inspection on Cessna 310 owned by NBAA Member J. R. Watkins Co. □ NBAA Member Giddings & Lewis Mach. Tool Co. had special radio work completed on their Lodestar, plus 100-hr. inspection. □ Engine majors and annual inspections were run on the Navions owned by Barzen Co., Mpls., Hodgman & Sons Contractors, Fairmount, Minn., and engine major for McKee Motors, Canada. □ Annuals were run on Halvorson Trees Aero Commander and Navions of Frank Krohn, Ia., Kenneth Albrecht, Ia., Donaldson Const., LeCenter, Minn. □ Wing tanks installed on Dr. Robt. Krohn's Navion from Wis. □ Radio work completed on Northern Engraving's Cessna 310 and the Piper Apache of National Can Retinning. □ Gramm Trailer Co., Lima, O., had both engines majored and annual inspection of their Aero Commander at Van's.

■ Aircraft Tank Service, Burbank, has returned the Forest Oil Co. Lodestar to service after modification of each outer wing panel to 345 gal. CAA approved integral fuel tanks. This modification deletes center section tanks completely. Ray Johnson is Pilot for the Bradford, Pa. based plane.

■ Airwork Corp., Millville, N.J., announces completion of plans for a new building at the Atlanta Branch, to house instrument & accessory overhaul, offices, spare parts warehouse. New 7500 sq. ft. bldg. is air-conditioned; target completion date June 1. Branch Mgr. is Wm. Schultz. Space required for recent appointment of Airwork as dist. for Eclipse-Pioneer, Montrose, Red Bank and Utica divs. of Bendix, and for Pesco Prods.

■ Reading Aviation Service completed radio installation work on an Aero Commander 680 from Aero Southern, Nashville, Tenn., distributor. Installation included: ARC ADF-21, 15-D omni with IN-14 indicator, CD-1 course director; Narco 1016 Sapphire 360-channel transceiver; Narco Mk II and Lear L-2 autopilot with altitude control; R89M glide-slope receiver; ARC R-20 marker beacon receiver; ARC-F-13 audio amplifier; new instrument panel and custom radio panel; Sunair hi-freq. transceiver with trailing wire antenna. □ Two DeHavilland Doves in for X-ray of main spar in compliance with AD note. One from Boyertown Auto Body Works, Boyertown, Pa., other from Rish Equip. Co., Bluefield, W. Va. Sam Hyams, Rish Chief Pilot, had 360 Dare, ARC 15-D omni, R89M glide slope and F-11 isolation system installed. □ Sun Oil DC-3 and Maryland Airways Twin Riley in for 100-hr airframe inspection. □ Chief Pilot Dick Benson of Amphibious Charters brought in their Grumman Widgeon for addition of auxiliary fuel tank, metalizing the wings, installing gross-wt. increase kit allowing 5500 lb. on both land & water. RAS also installed Narco Mk II omnigator and overhauled propellers. □ Camera port put in bottom of Aero Commander operated by Michael Baker, Jr., Rochester, Pa., engrg. firm. Installation includes frame & hatch cover for mounting of aerial camera. □ Warren Green, Pilot for Empire Steel Castings, Reading, had ARC 15-D omni, F-13A audio amplifier, Lear 2200 marker beacon installed in the company 560 Aero Commander. □ Clemson Bros., Middletown, N.Y., had their Twin Bonanza in for installation of ARC 15-D omni, ARC 21 ADF, Collins 51 V-3 ¼-width ATR glide slope receiver, ARC 16-706 course indicator, ARC CD-1 course director, new radio control panel. Charles Kerper is Pilot.

■ Aircraft Radio & Accessory Co., Denver, installed dual ARC 15D omni, CD-1 course director, Collins glide slope, Bendix RA-18 receiver and TA-20 transmitter, Dare transceiver, custom edge-lighted radio panel and complete rewire of all electronics equipment including new junction box in Lodestar operated by Hudson Bay Oil & Gas Co. □ For Maytag Aircraft's Aero Commander 680, dual ARC omni, ADF-21, Collins glide slope, Bendix marker, ARC course director, ARC amplifier, Collins receiver and transmitter, edge-lighted radio panel and new instrument panel.(*Cont'd. p. 22*)

MAINTENANCE

Pesco Shifts to All-Aircraft Line

The Pesco Products Div. of the Borg-Warner Corp. announces that it will now be devoted exclusively to the engineering and production of hydraulic, electric, air and fuel accessories for aircraft. Pesco's former Industrial Div. has become a separate Borg-Warner facility, the Wooster Div. The entire Pesco plant at Bedford, O., 312,631 sq. ft., will be used for the production of aircraft fuel and fuel booster pumps, hydraulic and air pumps, and other accessories.

New Device Locates "Blind" Holes In Airplane Structures

Mechanics working on the conversion of aircraft will be interested in a device called the "Blindriller," developed by a Boeing manufacturing research engineer to help locate "blind" holes in non-ferrous structural aircraft parts.

The tool is reported to operate on a magnetic detection principle. A small magnet is inserted in the hidden hole in the structural member and the new unit, which contains a sensing tube housing a jewel-mounted pointer, is placed on the outside skin. The magnet-tipped pointer seeks the hidden magnet as the tool is moved over the surface, and the hidden hole is located when the pointer is "zeroed."

Although the locator is for use on non-ferrous structures, it is said to be unaffected by close proximity of magnetic materials. It is suggested for use in any situation where the location of a hidden point must be transferred to the surface.

"Blindrillers" are manufactured under a Boeing license.

Safe New Corrosion Remover

A new powdered acid material for the removal of rust, scale and corrosion with greater safety to metal surfaces as well as to personnel is reported by Oakite Products.

Added to water in concentrations upward of 8 oz. to the gal., Oakite "Drycid" is said to be readily soluble, and to be useful in applications by circulation or immersion. Solutions of the compound may be used cold or, for faster action, heated to 165°F. It is reported effective in the removal of scale, scale-like deposits, rust, iron sulphides and other oxides.

Shipment of this product requires no returnable carboys. It has a mild odor and non-fuming characteristics. It is described as safer for use on aluminum, brass and galvanized surfaces.

Business Aircraft Maintenance Checkpoints

The following maintenance checkpoints, the result of operational experience with various popular business aircraft, will be of interest to the operators of similar aircraft or maintenance bases.

Beechcraft D18S—Shear Pin (tail wheel): Difficulty was encountered on landing, resulting from shearing of the tail wheel gear shear pin. The aircraft manufacturer markets, in kit form, an approved tail skid which prevents damage to the empennage in event tail wheel fails to extend.

Beechcraft D18S—"Klixon" 50 Amp Circuit Breaker: Subsequent to left generator becoming inoperative, the right generator burned out due to the overload. Inspection of the circuit breaker located under the cockpit floor, right side, disclosed breaker having an accumulation of water and rust.

Beechcraft E18S — 11.00-12 Sky Champion (8) Rayon Tire (Firestone): Difficulty has been encountered subsequent to the installation of the subject tires, which were oversize to the extent of damaging the wheel well doors on retraction. The possibility that some tires may have been fabricated in a mismarked mold is evident. These oversize tires, demounted and uninflated, measured 102¾" in circumference as compared to 96¼" measurement of the replaced tires when new.

Beechcraft F35 & G35—Generator Drive-Lock Washer: An increasing number of reports have been received disclosing disintegration of the subject lock washer, resulting in damage to internal engine parts. Some operators report that they inspect the generator drive assembly every 100 hrs. and replace the gear retainer nut and washer at that time.

Beechcraft D50—"Pesco" Fuel Pump P/N-3P-R400-BRD-5: Fuel pump diaphragm ruptured; this resulted in fuel leaking out of the vent into the engine compartment.

Camair 480—Landing Gear Drag Link P/N-143-33165-10: The upper drag link separated at upper gusset weld. Subsequently the right drag link was X-rayed, which showed definite signs of fatigue stress and possible beginning of hairline cracking.

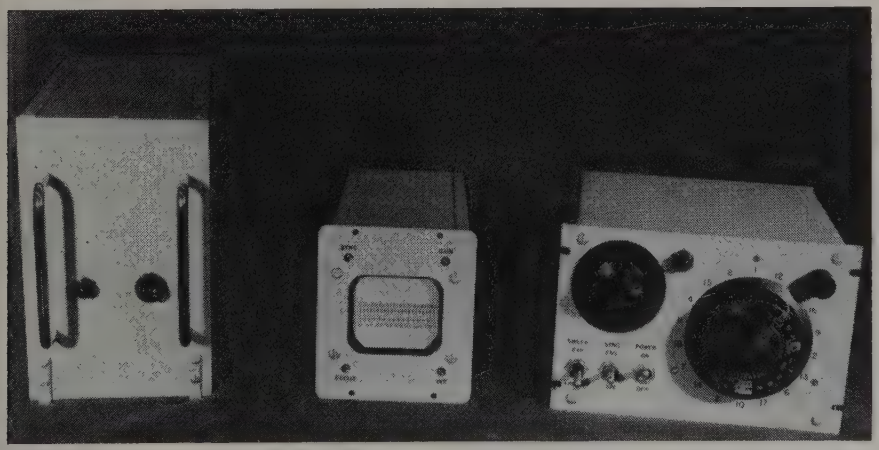
How to Use Adapters With Torque Wrenches

In the compact structure of modern aircraft it is not uncommon for maintenance mechanics to learn that conventional socket or open-end wrenches cannot be used efficiently without the addition of an adapter specifically fabricated to fit standard tools to specialized requirements.

On applications requiring special tools it is often desirable to control torque, and the solution to many such problems is simply a matter of adapting the special tool to the torque wrench.

In using adapters with a torque wrench it is important that the torque wrench have some form of concentrated handloading position, such as a pivoted handle. You must also take into consideration the fact that the use of an adapter will increase the capacity of any torque wrench.

An easy rule to remember when using adapters is that the adapter will increase the capacity of a torque wrench in proportion to the lever length of the adapter to the lever length of the wrench. For example, if an adapter were 15" center to center, and the torque wrench 15" center to center of



AIRBORNE *analyzer, available from Land-Air, Inc., is capable of both ignition and vibration analysis on 7, 9, 14, 18 and 28 cylinder engines. Construction and design reported to meet or exceed applicable MIL specs. "Inflite 130" designed in 3 "packages" with total wt. of 27 lb.; occupies a volume of 0.7 cu. ft. Power consumption: 50w. Synchronization between CRT indicator Sweep and Engine Crankshaft is achieved by utilizing output of timing pulse pick-up.*

the concentrated load position, the torque reading would be doubled.

Thus a simple adapter would permit making two torque wrenches from one, and increase economy by permitting the purchase of the less expensive and more versatile of two possible choices of torque wrenches.

The following formula should be kept on hand to permit proper selection of the lever length of an adapter and a suitable torque wrench. In the formula A = Length of Adapter, T_a = Torque Exerted at the end of the Adapter, T_w = Wrench scale reading, L = Lever Length of Torque Wrench.

$$\frac{A = (T_a - T_w) \times L}{TW}$$

Because an adapter will increase the capacity of a torque wrench, it may be desirable in production application to have the torque wrench furnished with a special scale, which would compensate for the extra capacity and give direct readings.

New Facilities at San Francisco Airport

Good news for business aviation is the announcement of developments at San Francisco Airport, to make it one of the best executive ports in the country by early summer.

Bay Aviation Services Co. handles the executive aircraft terminal, and they report that within the next few months a new 40,000 sq. ft. hangar will have been completed, at a cost of almost a half million, to accommodate the largest executive aircraft.

Included among these expanded facilities will be maintenance and repair service for almost all types of equipment, and very large parking areas. For the crews of itinerant aircraft will be two crew-rooms with beds, at no charge, and a complete briefing area for weather and flight planning, including the latest NOTAMS. Car rental facilities and an air taxi will add to the convenience of the airport for executives and crews alike.

New 400 CPS Frequency Meter

A new 400 cycle per sec. frequency meter for aircraft instrument panels has been developed by Consolidated Avionics Corp., N.Y., which provides 0.25% accuracy over a temperature range from —55°C to 70°C. Designated Model #200, the new meter is designed in conformance with MIL-E-5400 specs, and selected units are reported available for greater accuracy and wider temperature ranges.

The dial face is calibrated from 392 to 408 CPS and may be mounted on an instrument panel with the tubeless electronics portion of the meter mounted elsewhere, a valuable feature in view of the space shortage in the instrument panel area. The meter is reportedly designed to operate on 155v with only negligible voltage sensitivity at the frequency center.

. . . . in the business hangar

■ Dallas Aero Service. □ Convair brake installation, spring rudder tab installation and annual inspection completed on Green Const. Co. Lodestar, Paul Duncan, Pilot. □ X-ray exam of Jennings Drilling Co. Twin Beech completed. □ Mene Grande Oil's Aero Commander in from S.A. for outside paint job, installation of fuel flow meters and dual hydraulics. □ Nello-Tear Co. DeHavilland Dove at DAS for 100-hr. inspection, X-ray, spar inspection and control bracket modifications. Pilot is Rodney Hudson. □ Sun Oil's Aero Commander, Gene Reger, Pilot, at DAS for 100-hr. inspection. □ James Harris recently flew his Aero Commander to DAS for rudder change. □ 100-hr. inspection completed on General Minerals' DeHavilland Dove, Pilot Don Ice.

■ Executive Airmotive, Parkersburg, W. Va., has completed 500-hr. inspection of the Piper Apache operated by Broughton's Farm Dairy, Marietta, O., Ralph Boso, Pilot. □ Dick Life took the Athens (O.) Flooring Co. Apache to E-A for 100-hr. inspection. □ R. J. Bedard flew the Olin Mathieson Apache in for rework of prop governors and installation of new vacuum pump. □ Carl Smith, Pipeline Construction Contractor of Parkersburg, is having dual ARC omni and ARC-CD-1 course director in his Twin Bonanza.

■ Blue Grass Airmotive, Lexington, Ky., has been appointed Beechcraft distributor for most of Tenn. and Ky. Blue-Grass offers service and character facilities, will offer the new TravelAir in addition to Bonanza, Twin Bonanza, Super 18. B. L. Davis is Pres., E. J. Davis VP, F. H. Davis Sec'y-Treas.; family also operates 2 Bonanzas in connection with their coal mine (Midland Mining Co.)

■ Garrett Corp.'s AiResearch Div., Los Angeles Internat'l, received Texas Eastern Transmission Corp.'s DC-3 for major overhaul: exterior repainting, installation of complete executive interior with picture windows, AiResearch Maximizer, Janitrol Heater, RCA radar, 1830-94 engine installation. Flown in by Chief Pilot Jim Ketner and John Hardy. □ Sawhill Tubular Prod.'s DC-3 had 100-hr. check on aircraft & engines, plus AiRes. Maximizer. Pilots L. J. Smith and Bill Dennison were on hand. □ Executive interior, auxiliary power unit, and Sperry Engine Analyzer installed in Ford Motor Co.'s new Convair 440, accompanied to AiResearch by Air Transp. Mgr. B. J. Bergesen and Chief Pilot Bob Hixon. □ North American Life & Casualty Co. DC-3 in for partial refurbushing of cabin interior and cockpit. Pilots Chuck Wilson and Russ Stoddard brought the ship in. □ The *Green Hornet*, Garrett Corp.'s own DC-3, is in shops for major overhaul, complete rewiring, modernization of cockpit area & instrument system, plus 1830-94 engine installation. □ Earl Hartman, Chief Pilot for Goodyear of Calif., reports greater speed and reduced maint. with AiResearch speed modernization in the Goodyear D18S. Plane has flown over 300 hrs. since modification. Same installation purchased by Richfield Oil Co., Ohio Aviation. □ 100-hr. inspection and minor maint. for McCulloch Motors' Super E-18, Chief Pilot Jim Dyerly. □ DC-3 from North American Av. undergoing center-section attach angle modification, all control surfaces recovered, exterior repainting. □ CAA at Oke City has AiResearch geared rudder boost-tab on its DC-3.

■ Executive Aircraft Service, Dallas, completed periodic inspection and major repairs on Atlantic Rfg. Co. of Dallas DC-3, Herb Hansen, Chief Pilot. □ Creole Petroleum DC-3 from Caracas at EAS for modification of oil system for 2" electric firewall shut-off valves; recovering all control surfaces; installing large reclining cockpit chair on tracks for pilot; and major repairs. Chief Pilot is G. E. Warner; Hank Steinhauser is Flight Engr. □ Texas Co. DC-3, piloted by Steve Germick, in for misc. repairs at EAS. □ Ralph Lowe of Midland, Tex., had his Lodestar in for periodic inspection, misc. repairs and maintenance, including 1 engine change. Bob Hunton is Pilot, Joe Mims Co-Pilot/Mechanic.

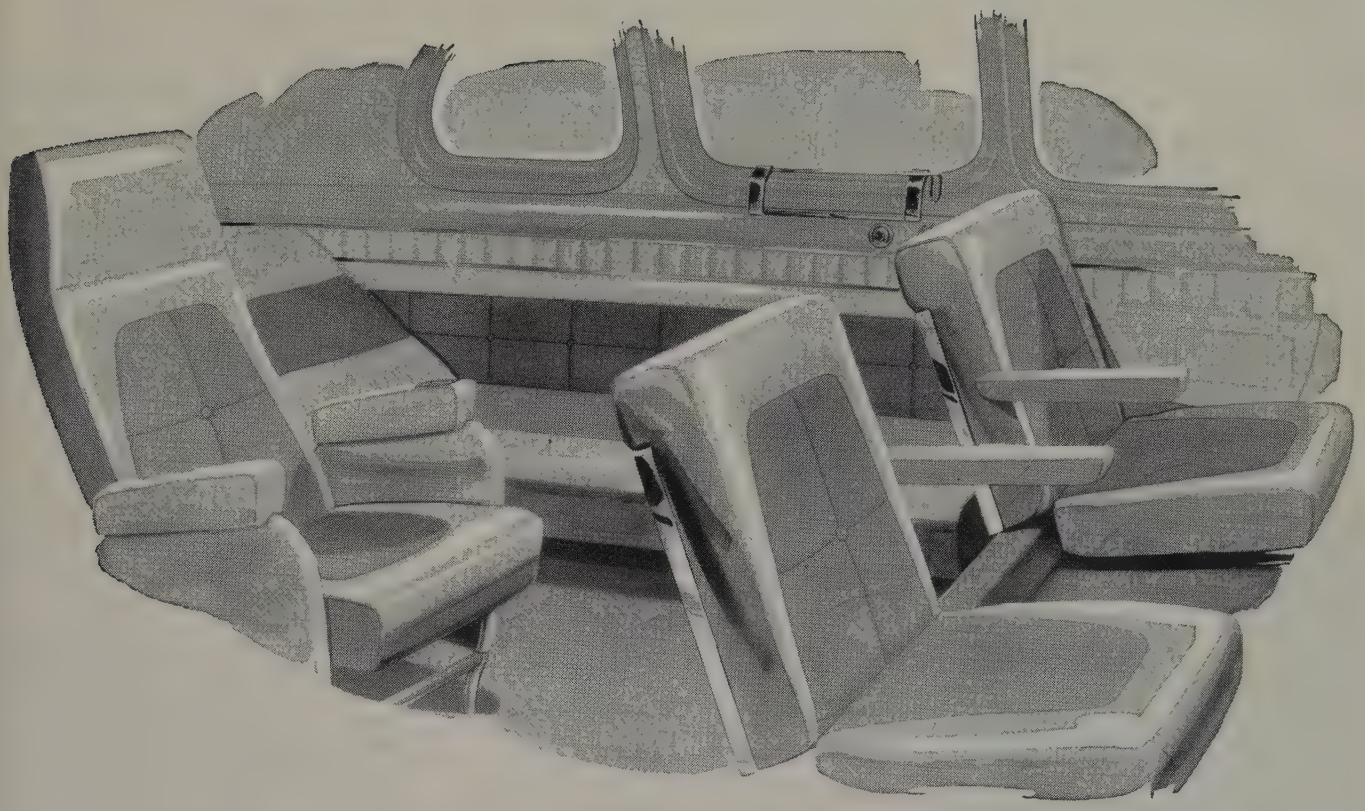
■ Pacific Airmotive Corp., Burbank. □ Pilot Len Mills has accepted delivery of M. H. Whittier's Twin Beech after 100-hr. inspection and relicense. □ President and Chief Pilot George Young brought Fairways' Convair 440 to PAC-Bur. for installation of auxiliary oil tank, wet wings and APU. □ Sears, Roebuck's PAC-based DC-3 has received engine change, 100-hr. inspection and modification of exhaust system in PAC's Bur. shops. Pilots are Geo. Fleming and Paul Caribelli. □ Turnaround and minor maint. recently completed by PAC included: North American Life and Casualty's DC-3 27C, Chief Pilot E. C. Spencer; King Oil's Twin Beech, piloted by Hardin Miller; Chance Vought's Learstar, Chief Pilot and NBAA Rep. A. L. Brill; Royalite Oil's Calgary-based Lodestar, Pilot Bob Hunter; International Minerals' Super 18, Capt. Bob Vinson; W. J. Gardner's Detroit Lockheed 12, Pilots Gene May and W. J. Gardner; Texas Eastern Transmission's Lodestar, Chief Pilots Jim Ketner and Pilot Jack Morgan.

■ PacAero Engrg. Corp., Santa Monica, is installing rudder spring tabs on Lodestar flown in by John Lyon, Chief Pilot for Malco Refineries. □ Minn. Mining & Mfg. has taken delivery of their Learstar Mk II. Don Richardson is Chief Pilot. □ U. S. Steel has taken delivery of their 3rd Learstar II; Don Teel is Chief Pilot. □ Johnson & Johnson Learstar II in for installation of long-range tanks for fuel capacity of 1340 gal. Bob Darnall is Chief Pilot. □ Ross Bennett, Chief Pilot for Sangamo Elec. Co., Ill., has taken delivery of their 1st Learstar II. Their 2nd Lodestar is at PacAero for conversion to Learstar II. □ Al Pinckley, Chief Pilot for Marathon Corp., has the Learstar II in for 100-hr inspection. □ Learstar II delivered to Landis Tool Co., Pa. Lee Balestra is Chief Pilot. □ Capt. Al Frank has the C. B. Wrightsman Learstar I at PacAero for installation of wing fillets.

■ Remmert-Werner, St. Louis, has delivered a Super-92 DC-3 to Trans Canada Pipeline, Ltd. Equipped with special custom interior, custom radio and instrument panels, Edison fire detectors, Collins,

(*Continued on page 39*)

The '57 Beechcraft Twin-Bonanza – Best Ever Built!

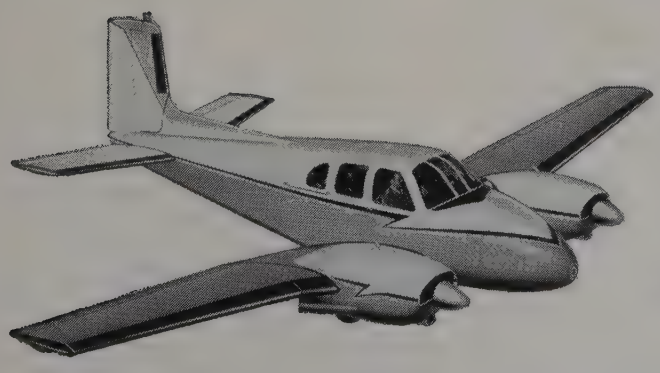


SIX WAYS TO *RELAX*

Here's relaxation . . . drama . . . styling . . . never before offered in aviation! *Six* different interior seating arrangements, including a six-foot ten-inch lounge, are yours in the new, fast, supercharged Beechcraft Twin-Bonanza for '57. Brilliant design in the new Twin-Bonanza provides speeds up to 240 miles-per-hour, a range of more than half a continent, "safety capsule" protection for all six cabin occupants who are *above* and *behind* whirling propellers. Visibility is unmatched — and automatic foldaway stairs provide easy entrance and exit without ducking, stooping or stretching.

You'll like Beechcraft's advanced concept of business travel . . . see your Beechcraft distributor or dealer for the most *appealing* airplanes in the skies and for a finance plan that will most *comfortably* fit your business operation.

The Twin-Bonanza welcomes comparison!



Beechcraft

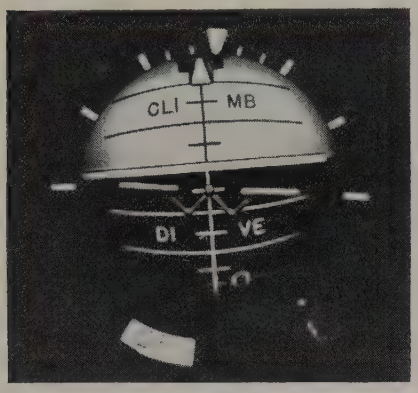
BEECHCRAFTS ARE THE AIR FLEET OF AMERICAN BUSINESS

NAVICOM

All-Transistor Attitude Indicator Designed For 'Copters

The first all-transistorized attitude indicator, designated Lear Model 4005H, designed expressly to improve all-weather flight capabilities of helicopters, has been put on the market by Lear-Grand Rapids.

The new indicator already has been specified as standard equipment for the Navy HUS-1 (Sikorsky S-58) and HR2S (Sikorsky S-56) helicopters as a result of a successful flight testing program initiated by the Bureau of Aeronautics at the USN Air Test Center, Patuxent, Md.



A completely transistorized amplifier offers reduced weight and power requirements, longer life and increased reliability and compactness. Transistors also offer more ruggedness and can withstand higher temperatures than the vacuum tubes formerly used to amplify signals to the instrument.

Before the switch to transistors for amplification, vacuum tubes were housed in separate amplifier units with a volume about that of a cigar box. Now, with the smaller and lighter transistors, all the amplifiers have been reduced to occupy a 4" cube which fits right on the back of the indicator case. The miniaturized transistor amplifiers have been designed into the indicator case without increasing the size or length of the case.

It is absolutely necessary that the pilot be able to read his attitude indicator at all times. Yet, that critical instrument is most difficult to light adequately at night because it is the only indicator on the instrument panel with a spherical face. The Lear indicator has a new feature called integral lighting which lights the curved face of the indicator from within and thereby makes the sphere much easier to read at night.

In the Model 4005H, the moving background sphere is fabricated of translucent plastic. Miniature light bulbs of extremely long life are sealed within it to cause the background sphere to glow with the red light standard for Navy instrumental panel lighting.

The only instrument specifically tailored to helicopter requirements, the indicator provides for pilot-adjusted electrical roll trim in addition to the electrical pitch trim which is standard on all Lear VGI systems for fixed-wing aircraft. Electrical roll trim is necessary for helicopter indicators in order that the pilot can trim his indicator in roll as well as in pitch, enabling him to cope with the unusual flight attitudes possible with rotary-wing aircraft.

In the HUS-1 and HR2S applications, the indicator uses as its reference the same Lear all-steel Vertical Gyro, already installed in the Lear-supplied auto-pilot amplifier. Such a tie-in of 2 or more systems to a common central vertical reference unit means significant savings in overall weight, size and cost.

CAA Seeks Better Light On Runway Surfaces

Another of the few remaining obstacles to all-weather air travel service is under attack by CAA in an experimental installation of runway surface lighting at Andrews AFB Washington.

"When we can make it feasible to land under ceilings less than 200′ or with visibility less than ½ mi.," stated James T. Pyle, Administrator, "air service will improve and airports will be more valuable to communities with no sacrifice of safety."

At the Air Force base, CAA engineers have two systems installed by which the problem created by the "black pit" may be eliminated. One consists of a temporary installation of lights with the beam of the lights directed by baffles toward the pilot approaching for a landing. These lights are in groups of 3, placed 7½′ apart on positioning bars which are at intervals of 100′ along 3,000′ of the runway. The bars are perpendicular to the center-line of the runway on each side, the nearest light being 30′ from the centerline. The effect is to narrow the landing area to 60′ in the "narrow gauge" installation, the lights on the runway surface giving the pilot a reference for touching his wheels down.

Another group of bars is placed 45′ from the centerline giving a landing area 90′ wide. The lights can be moved at will for the study, and switches make it possible for the engineers to produce a variety of effects for observation. Civil and military pilots have begun to flight test the experimental installations and to express their opinions and advice.

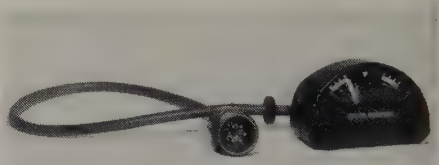
The other system is a floodlight system using high output fluorescent lights at the edges of the runway. This light reflects upon squares and lines painted on the runway with a mixture containing aluminum silicate crystals to increase reflectivity.

In a flight test demonstration to reporters, Administrator Pyle pointed out the values and shortcomings of each system, and described still other possible methods, which are to be studied, of assisting the pilot in his actual touchdown on runway surfaces. Through the cooperation of the Air Force, the developmental work will continue under the direction of John Herner, Chief Airport Div., Technical Development Center at Indianapolis, James H. Harding, pilot and project engineer, and Robt. F. Gates, Flight Operations Specialist. All interested segments of the aviation industry have been invited to inspect and flight test the installations.

Improved Speed Control Indicator Aids Approach

The Speed Control Indicator of the Safe Flight Speed Control System has been re-designed to improve the instrument's location in the cockpit, and to improve the presentation of lift measurement information to the pilot.

The new Indicator is in a 'half round' shape, and therefore can be mounted directly on the inside cowl above the instrument panel, or it can be fitted into the glare shield of larger aircraft. This new location places the vital information of the lift condition of the wing in the pilot's line of sight, permitting his full concentration on the runway during his approach, and always keeping him aware of the corrections necessary to make an optimum approach. Eliminated is the necessity for frequent and distracting glances at the instrument panel, interpretation of airspeed readings, or the computations necessary to determine proper approach lift conditions for the aircraft.



The small size of the new Indicator permits full normal forward vision.

IFR-To-Visual Transition Problem Eliminated?

A significant development in the field of simplified aircraft cockpit instrumentation was announced today by Autonetics, a div of North American Av., Inc., Downey, Cal.

Called the Instrument Display Projector, the compact device provides at a glance information essential to pilots for completing an instrument landing, while at the same time allowing visual contact outside the airplane.

Components are a miniature-type (1½" dia.) cathode ray tube; a mirror system; collimating optics, or optics that make light rays parallel, and a trichroic combining glass that uses a color contrast principle to enhance definition of the reflected image.

With the color separation principle

and conventional cathode ray tube, the instrument is capable of obtaining suitable image definition against a bright sky background.

An example of actual application of the instrument would be the presentation of Instrument Landing System data for transport aircraft. In this case, the cathode ray tube image would reproduce the crosspointer indication, artificial horizon, and a moving 'pip' denoting deviation from desired approach speed. With this information appearing on the windshield display, the pilot could simultaneously assimilate such data and watch for visual contact with the runway.

In operation, the cathode ray tube's image is reflected by the mirror system to the collimating optics and then to the color-separating combining glass. The combining glass is interposed in the pilot's line of vision immediately in front of the cockpit windshield.

Since the display is focused to infinity, flight data reproduced on the cathode ray tube appear to the pilot as a bright image suspended in space. As a result, the pilot has *no eye accommodation problem*, or one that would require him to transfer his visual attention from the tube image to objects outside the airplane.

The instrument's color contrast is obtained from the specially-coated combining glass which very efficiently reflects light in the narrow color band—in this case, green. The richly green image appears in contrast to the green-minus light from outside the aircraft. Because the narrow spectrum is extracted from background light, external sources—such as an airport runway's boundary lights—do not noticeably change color or intensity when viewed through the combining glass.

Piedmont Area To Get Radar Approach Control

Among the 22 radar micro-wave link country-wide installations contracted for by CAA will be one at Benson, N. C., where a radar will be established and operated on the spot as a purely local operation to handle approach control functions for Raleigh-Durham, Fayetville Municipal, Pope Field at Ft. Bragg near Fayetteville, and Seymour Johnson AFB at Goldsboro, N. C., and for low altitude tower control in the congested triangle covered by these locations.

Speech Compressor Improves Communications Efficiency

Even with the improved intelligibility of VHF over L/MF radio, the efficiency of 2-way air-ground communications is far below desired levels. Cross-talk at high altitudes, atmospherics and other physical phenomena still add to the confusion of hi-density airway and terminal communications. Constant, necessary repetition and redundancy is the inevitable result. Simplex channels today are overly saturated, and any device or technique that could reduce the air-time required to exchange any air traffic control intelligence is welcome.

An engineer at Temco Aircraft Corp. has come up with a gadget to "squeeze" the human voice into a narrow range for improved radio transmission.

The "transistorized instantaneous speech compressor" as the device is called, was developed by Charles R. Rutherford, electronics engineer at Temco's Dallas plant.

Military needs for more intelligibility and a 50% longer range with field communications equipment now available, prompted development of the speech compressor. In use, the speech compressor squeezes peak values of voice sounds to nearly the same level as average sounds. Since intelligibility is more important than quality of speech, the narrow, almost monotone range of speech compressed to a 24-decibel limit serves the needs of communication.

Earlier research during WW II showed that vowel sounds contain the major portion of speech power but contribute very little to intelligibility. Consonant sounds, on the other hand, contain very little speech power but contribute materially to intelligibility. Consonant sounds are pared to near the level of vowel sounds by the speech compressor.

Interference from background noises such as aircraft is lessened by the speech compressor.

Rutherford utilized the latest in silicon transistor techniques in designing the extremely compact speech compressor. The device operates with communications transmitters having available voltage of 24 to 28, and test of ground-to-air equipment have shown that the maximum range can be increased 100% by use of the compressor.

Aircraft Radio Station Licenses

Pilots and owners of aircraft are reminded that all radio transmitters used aboard civil aircraft must be licensed by the FCC, and that the station license must be carried aboard the aircraft at all times. If your license has expired, or is about to expire, application should be submitted on FCC Form 404, copies of which may be obtained from the Commission's Washington office or any of its field offices.

New CAA VORs For Nebraska

Sites for two new CAA omni navigational facilities have been selected in Nebraska. The Kansas City Regional Air Space Subcommittee has recommended that installation of a VOR on the O'Neill, Neb., Airport and a VOR 2½ mi. SE of Wolbach be approved.

They will be a part of a high altitude system of airways being established across the U. S., but will be used the same way as the present VORs for navigational purposes by general aviation aircraft.

These stations will definitely help to fill in some of the blank spots in Neb. and will certainly help make navigation easier.

The new VORs should be in commission and operating sometime this year.

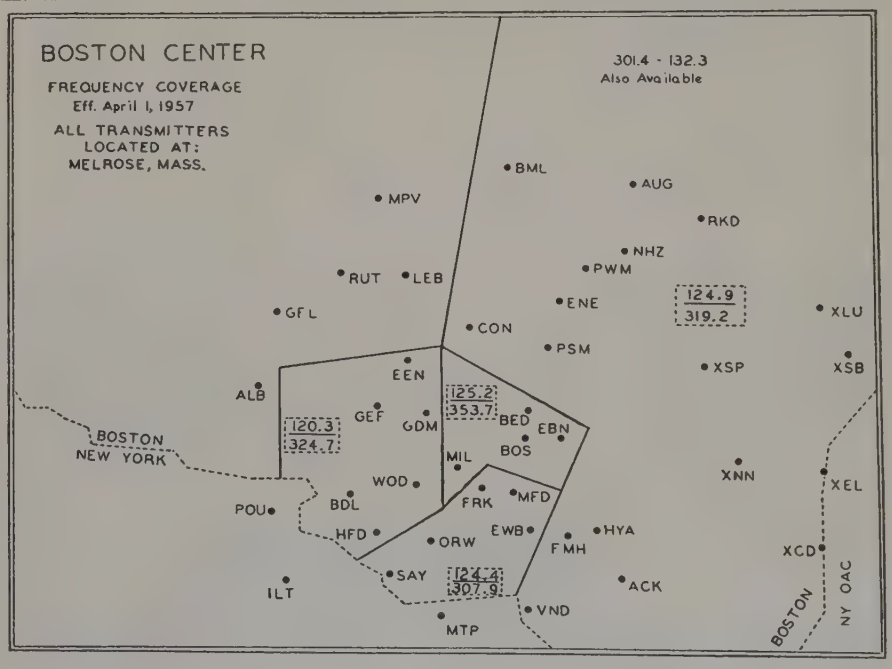
Dual-Purpose Antenna Described

Standing-wave ratios and radiation pattern diagrams, and descriptions of the Type A-13B VHF Navigational Antenna are contained in a new brochure by Aircraft Radio Corp., Boonton, N. J.

The Type A-13B incorporates 2 broadbanded antennas, one for use with VOR and runway localizer receivers, and one for use with glide-path receivers. It is designed for use on all types of aircraft.

Radio Fixes Renamed In Chicago Area

The following fixes are in the process of being re-named to eliminate confusion between Keeler vs. Wheeler and Wheeler vs. Wheeling. Wheeling VOR will become Northbrook; Wheeler intersection will be replaced by Westville.



SAFETY EXCHANGE

In-Flight Weather Safety Service Program

This spring FAWS Centers began issuing special short-term area weather advisories aimed specifically at providing airmen *in flight*, military as well as civilian, with advance radio notice of potentially hazardous weather developments. Included in these advisories are information on locally severe weather such as tornadoes, thunderstorms, hail, duststorms, icing and turbulence, and also phenomena producing extensive areas of low ceiling, restricted visibility and strong, gusty surface winds.

These special short-term advices, known as *Flash Advisories* give up to 2 hrs. advance warning of potentially hazardous weather conditions and are distributed to CAA Traffic Communications Stations located inside the area affected by the Flash Advisory and those within 200 mi. of the affected area. They broadcast the Flash Advisory on receipt and include them in subsequent scheduled weather broadcasts until the advisory is superceded or expires. Also, they radio the Flash Advisories to individual aircraft, as appropriate, in the course of providing in-flight assistance service.

Although Flash Advisories are intended primarily for the man *in the air*, it is expected that pilots at field stations obtaining pre-flight weather briefing will find the Flash Advisories helpful for flights beginning within the next hour or so. Information on the broader aspects of the area weather developments, and for longer periods, will necessarily continue to be included in the Area Forecasts.

All location references stated in Flash Advisories, other than political boundaries or well known geographical features, are Compulsory IFR Aircraft Position Reporting Points. In many cases the names of position reporting points also apply to weather reporting points; other place names used may be new to briefers, if not to pilots. A special map showing all compulsory position reporting points has been prepared and copies have been sent to all stations.

New Windshield Coating

An ice and fog preventive coating for aircraft windshields, giving better visibility than any previous coating, has been developed for the Air Force by Battelle Institute, Columbus, O.

The electrically conducting coating, a tin-doped indium oxide film, is the result of a research program outlined by the Materials Lab. of ARDC's Wright Air Dev. Center. It has a light loss of only 15-20%, which can be reduced to 12% by use of anti-reflective coatings, and can be produced at temperatures lower than previously required.

Directed by Dr. H. L. Goering and Mr. C. S. Peet, the Battelle research men produced indium oxide-coated glass specimens at temperatures between 250° and 400°, considerably below the annealing temperature of glass. In addition to its high transparency, the new coating has a low electrical resistance, and conducts an electric current to heat the underlying windshield glass, melting the ice and dissipating the fog.

Aircraft windshields are mounted obliquely to the line of flight. Because the slant reduces light transmittance, it is important that any deicing film reduce as little as possible the amount of light transmitted. The indium oxide films meet this criterion, according to Battelle scientists, for the transmittance values achieved are only a few per cent less than the value for uncoated glass.

WADC project engrs. on the process were J. R. Cannon and Robt. Besancon, both of Dayton, O.

New Series Aircraft Emergency Evacuation Lights

A new emergency evacuation light for aircraft, designed to comply with recent CAA regulations *requiring* emergency lighting, has been announced by Safe Lighting, Inc.

The new "Evaculite" unit features a newly designed inertia switch which automatically turns on the light when it receives a deceleration impact of "sufficient magnitude and duration." (CAA recommends a deceleration of 1½G over a period of 1/30th sec. for operation of such devices.)

The Evaculite measures 7¾ x 4¾ x 2″. It is available in 2 series, "Power Failure" and "Inertia" (G) series. The 3 models in the Power Failure series require wiring into the plane's power circuit, and whenever a failure occurs in this circuit a relay automatically turns on the Evaculite, which remains lighted until it is turned off manually.

The 5 models in the G series require no wiring, since they are activated entirely by impact forces. Although the G series require mounting with the inertia switch in the vertical position, the switch itself is adjustable within a range of 30°. Special models are available in both series for ceiling mounting. Units in both series may be operated manually.

A self-contained unit, the Evaculite is composed of 2 assemblies: the cover assembly, comprising unbreakable lens, bulb and reflector; and the battery pack assembly, comprising batteries, switch, relay and (in the G series) the inertia switch components. The bulb, reflector and lens have been designed as a sealed unit to exclude dust. The battery cartridge is simply pushed into position for replacement.

The portable Evaculite is held to the back plate by a quick-release device.

Air Associates, Inc., is exclusive distributor for the Evaculite. Models are available through every branch.

Over 1000 In-Flight Near-Collision Per Year

CAB reports that it has received voluntary pilot reports indicating 452 near-collisions in military and civil plane operations in the U. S. during the last 4 mo. of 1956.

The Board began its near-collision survey program last May. Its first interim report is a statistical analysis without comment or Board conclusions. It was distributed to appropriate government and industry sources for review in an effort to accelerate solution of current air traffic problems.

The 259 reporting military pilots said that among the second aircraft involved in the incidents were 131 military, 104 civil and 24 unidentified planes. The 193 reporting civil pilots said their near-collisions involved 73 military, 110 civil and 10 "unknown" planes. Of the reporting civil pilots, only 83 were on scheduled airline flights.

An estimated 4500 persons were aboard the reporting pilots' planes, the reports said. No estimates were made as to persons aboard the other aircraft involved.

Statistics showed 55% of the flights reporting were in point-to-point transit. The remainder were training, check or local flights, or unreported as to type.

Nearly 9 out of 10 of the reported incidents occurred in controlled airspace; 55% were "enroute" as opposed to arriving or departing at airports. Of the arrival and departure incidents, about ¾ occurred below 3,000′ altitudes.

The pilots said about 40% of the other aircraft were crossing their courses; 38% approached head-on, and 20% were roughly on the same course as the reporting pilot.

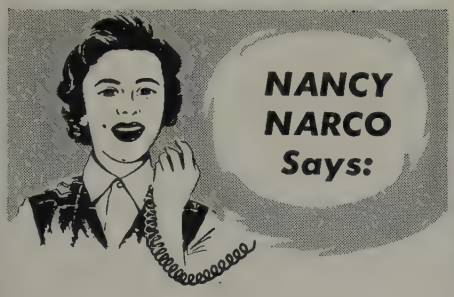
Evasive action was taken in 313 cases and in 51 others it was impossible, the pilots reported. About 1/3 of the planes involved were said to be jets.

Spraymat De-Icing

One of the remaining deterrents to the more efficient business use of single-engine and light twin-engine aircraft is the threat of icing conditions in winter or in northern latitudes. However, the common anti-icing methods for the larger commercial craft are too heavy and expensive, and the short effective duration of anti-icing fluids is outweighed by the work involved in applying it. The air carriers are understandably uneasy about employing gasoline-type heaters in the rear of the fuselage for thermal de-icing of tail surfaces.

Bristol Aircraft of England considers the Napier "Spraymat" system best for the tail structures of their new *Britannias*, and these tail structures, in span

(*Continued on page 30*)



SEEMS A LOT OF US still don't have this communications channel business straight. It's not surprising, since I've been getting different stories from several different "experts." (If these guys didn't *say* they were experts I'd suspect they didn't know for sure what was going on.)

LEARNED A FEW THINGS, tho'. Let's whip up a "fer instance." Take the tower over at Reading, nestled in the Pennsylvania hills and almost entirely surrounded by Dutchmen. You wouldn't call it a congested area — except when Reading Aviation throws its annual Fair (which comes June 1 this year.) The very fine control tower does business on 119.1 mc.

IF YOU TUNE READING tower quite a while before you're in close, you find the frequency real crowded. Check the Airman's Guide and, sure enough—Washington National, 120 miles southwest, is also on 119.1. But don't quit yet — wasn't that a KLM Connie calling? Yep—book shows same frequency at Idlewild International Air Patch, 115 miles east of Reading. No wonder the channel is crowded!

WHY DON'T THEY use different frequencies? Let's check. In the area between Washington and Providence, and from about Harrisburg and Binghamton to the coast, there are 27 control towers, using 12 "ordinary" VHF frequencies (118.1, 118.3 . . . 121.3) exactly 35 times. Most of these 12 frequencies are used 3 times.

ACTUALLY, it's not the cross-talk between towers themselves that clutters the channel, but that between *aircraft talking* to the two different towers.

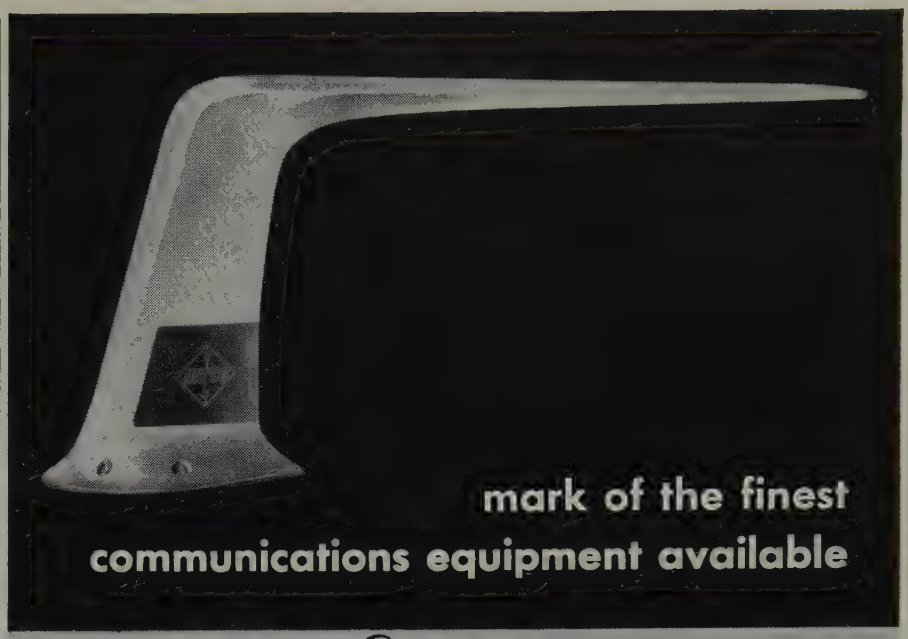
THE WHOLE SET-UP is getting *more* crowded all the time, so what to do? Well, for one thing, they're trying to put the more exotic communications (radar control, much of the direct Center communications) on channels between 123.7 and 126.7 mc where they won't interfere with primary tower frequencies. For another thing, they're starting to use frequencies *between* those we're used to — even-tenth megacycles like 120.4 and 120.6 for *other* than primary tower communications.

LOTS OF FINE PILOTS have never landed at Chicago Midway or Washington National, but the ones I've talked to want to be able to do it real smooth *if* and *when.* That means more channels — better figure on having them.

See y'all next month,

Nancy

NARCO • Fort Washington, Pa.

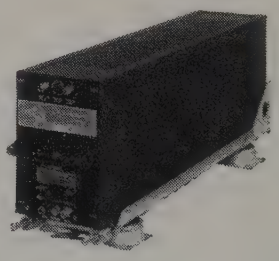


narco Sapphire 1016

90 or 360 CHANNEL TRANSMITTER
90 or 560 CHANNEL RECEIVER

When you see an aircraft with the Narco Sapphire 1016 antenna you know it's equipped with the ultimate in fine communications. Designed for reliable VHF communications on every frequency provided for present and future civil aircraft communications, the 1016 has a VHF transmitter capacity of 90 or 360 channels and crystal-controlled receiver of 560 channel capacity. Precise 50 kc separation is provided through the entire range from 108 to 135.95 mc.

The Sapphire 1016 is CAA-certificated for airline use and matches the quality, performance and dependability of the finest airline-type equipment. Yet its price compares with limited channel equipment normally used in executive aircraft.



1016 unit occupies ½ ATR rack; total weight 24¾ lbs.

NOW! PRECISION VOR/ILS CONVERTER FOR THE 1016

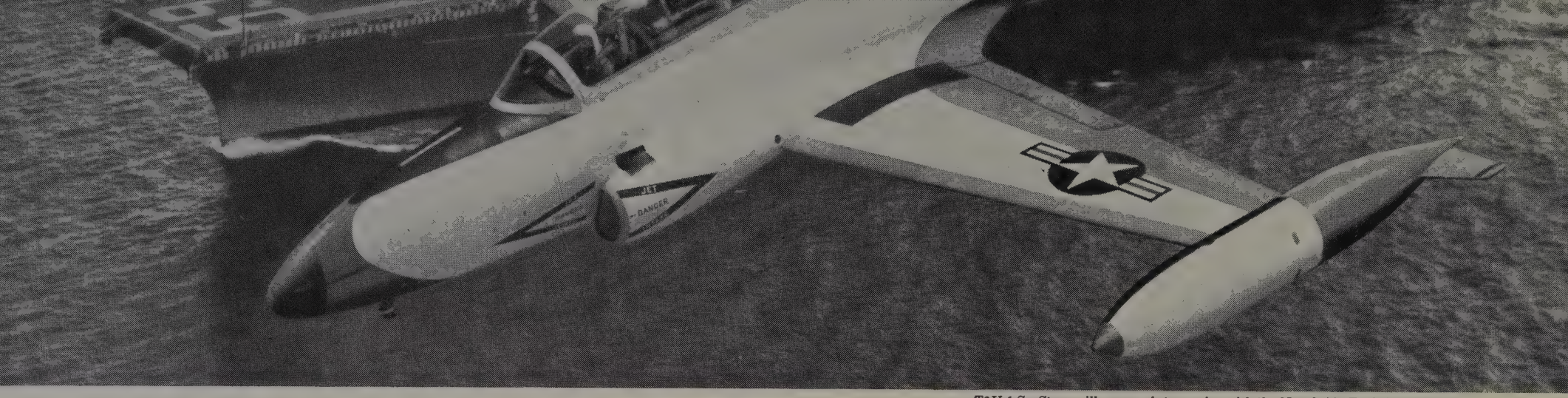
Now you can add VOR/ILS localizer function to the Sapphire 1016 with the Narco VOA-3 converter-indicator. Adaptable also to the Narco Simplexer. Fits any standard instrument cut-out; total weight, including remotely-installed converter unit, 4 pounds. Extreme accuracy and reliability. Only the Sapphire 1016 permits addition of VOR to crystal-controlled communications equipment.

See your Narco dealer or write for brochure

narco

NATIONAL AERONAUTICAL CORP., FORT WASHINGTON, PA.

NAVY



T2V-1 SeaStars will soon go into service with the Naval Air Training Command

9 OUT OF 10 U. S. MILITARY JET PILOTS WERE TRAINED IN LOCKHEED JETS. THE NAVY'S NEW T2V-1 "SEASTAR", BUILT BY LOCKHEED'S CALIFORNIA DIVISION, IS THE FIRST U. S. PRODUCTION PLANE WITH HIGH-SAFETY BOUNDARY LAYER CONTROL.

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and area, are larger than any of the U.S. single-engine or light-twin business aircraft.

As a safeguard against ice formation, the leading edges of the fin and tailplane of the *Britannia* airliners ordered by BOAC have Spraymat electrical heater elements. Originally this system was applied only to the elevator horn balances of the *Britannia*, but its effectiveness, simplicity and lightness have led to its being adopted for tail units also.

Spraymat consists of flame-sprayed metal elements sandwiched between layers of insulating material, the base insulation acting as an adhesive to secure the heater to the complement.

It is possible that the *Britannias* ordered by NEA will be treated with Spraymat. Fokker *Friendship* aircraft also have "Spraymat", although in some cases it is a limited application.

Negotiations have recently been concluded whereby Spraymat has been licensed in the U.S. to Packaero Engrg. Corp. (sub. of Pacific Aeromatic).

Two main types of Spraymat are in use, both of which employ flamesprayed conductor elements of either aluminum or kumanal and sprayed copper busbars to carry current from one element to the next at each change of direction. Spraymat Type I heaters employ a flame-sprayed insulation compound which is oven-cured at a temperature of 180°C. Insulation of Type II heaters is applied as a liquid with layers of glass cloth acting as bonding agent, curing temperature being between 80° and 100°C. It is thus an ideal heater for application to redux-bonded structures which impose a temperature limitation below that required by the oven method.

For the leading-edges of fin and tailplane, Type II heaters giving cyclic deicing are used because the large size of structural components makes it impracticable to cure insulation layers in an oven, and the redux-bonded corrugated inner skin imposes a limitation of 100° C. on curing temperature.

Each tailplane heater has an effective area of 53.8 sq. ft. and contains 15 independent heater circuits. The fin heater contains 11 circuits and covers an area of 32.6 sq. ft. All circuits operate from a 208v AC 3-phase supply.

Maximum power loading is 20.5 KW heating intensity, being graded in each case from 13 watts/sq. in. to 7 watts/sq. in. over the surface of the heater.

The lay-out of the tail unit heaters provides for heating of selected areas in given order and makes provision for proportionate load-shedding in event of alternator failure. Heaters are divided into 16 cyclically-heated areas, 4 on the fin and 6 on each tailplane, each area being sub-divided into primary and secondary zones. Continuously-heated breaker strips on extreme leading-edges prevents formation of ice-caps which might be held in place by air loads, and similar chordwise parting strips ensure clean shedding from each de-iced area.

Two cyclic switches are used to control the primary and secondary areas. In normal operation the current is switched to each primary area to detach the ice that has formed by water droplets freezing on impact. On changing to 2nd cyclic switch, the primary and secondary zones of each area are heated in turn, thus detaching any ice that may have formed as a result of water running back from the heated primary zones and freezing.

Cyclic de-icing of large areas of the areofoil surface greatly reduces the amount of power required as compared with continuous heating. If all 41 circuits in the *Britannia* tail unit heaters were operated simultaneously, the total power required would be over 220 KW.

Repairs to the Spraymat system can be made with little trouble. Serious mechanical damage is repaired by a grafting process in which the damaged area is removed and a new section of heater sprayed on to restore Spraymat to its original condition. A special repair kit is provided for minor repairs. With this, elements broken by mechanical damage are bridged by element-coated insulated strips which restore the continuity of circuits and heat up to the appropriate heating intensity, thus maintaining the full effectiveness of the heater.

The principal objections of weight and power requirements seem logical subjects for further development and refinement. The principle of application is nearest to the ideal for smaller business aircraft use for all-weather winter operation.

Weather Avoidance Radar Interference With ADF Receivers

A CAA Regional Maintenance Alert Bulletin reports that the AVQ 10 weather avoidance radar equipment has caused interference with ADF receivers. The pertinent parts of this report are quoted as follows:

"We have recently received reports of interference between the AVQ 10 radar and the MN 62 type ADF receivers in DC-6 and DC-7 type aircraft (nature of interference not noted). This has been traced to pulse radiation from the front panel of the TR unit due to insulation of this panel from the main chassis by painted mounting screws which did not affect an adequate bond.

"The panels referred to have been reworked by removing the anodized finish at the screw holes and replacing the screws with cadmium plated screws and lock washers. This cuts down the pulse radiation to an acceptable value in regard to the ADF system."

CAA advises that the manufacturer is aware of the above condition, and has taken corrective action on subsequent unit production.

CAA Advises on Use of Private Radio Facilities for IFR Approach

There has been considerable misinterpretation and/or possible abuse of the provisions of CAR 60.46(a) because of lack of guidance in pertinent CAA instructions, such as MOP, CAM, etc. Typical of such misinterpretation is the

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Crew Management

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interrupting the captain at such times. Under the circumstances, for a 1st officer to take over the controls from the captain to avert disaster would be considered a drastic step. Despite this situation, the only reason for carrying two pilots in the cockpit is in order that the responsibility can be shared and the safety of the flight increased."

Correlation can be established between these two accidents, although the action of the co-pilots is in sharp contrast. In both cases there was an organizational failure; the cockpit crews appear to have had insufficient training and experience as a *team.*

Recently a Boeing 377 was successfully ditched in the Pacific Ocean without loss of life or serious injury, and the crew members were lauded as heroes. Several years ago a Douglas DC-4 was ditched off Puerto Rico in the Atlantic with heavy loss of life, and the Captain was suspended and censured. A point of contrast which appears to me to have been determinative is that, in the case of the Boeing, the captain and crew had the benefit of more than 5 hrs. between the time their emergency developed and the moment they were forced to alight on the water while the captain and crew of the Douglas were afforded less than 5 min. Without detracting from the awareness of the competance of the Boeing's crew, it is safe to say that they had an enormous advantage over the Douglas' crew in that a 5-hr. grace period permits organization and preparation, while a 5-min. time interval prohibits any organization and preparation beyond what has taken place in training and in experience of interaction.

One area of flight safety which does not seem to be getting the attention it should is that of mental hygiene of flight crews. I shall not go so far toward the tenets of Freud as to contend that all accidents brought about by "carelessness' are either unconscious suicides, or unconscious expressions of hostility. But certainly preoccupations with personal problems, or intra-crew hostilities clearly contribute to "absent-mindedness."

L. I. O'Kelley of the University of Illinois, writing in "The Air Line Pilot" (Sept. '54, p. 11) says, "Since to achieve a safe performance the pilot must have a highly effective rate of time-sharing between many essential transactions, time devoted to apprehension, self-doubting and worry means less essential transactions in any given unit of time."

He goes on to point out that "A second effect of stress is a diminished capacity for receiving information. While riding as an observer on a crucial check-ride of a very experienced, but very worried and anxious pilot, I counted ten instances of relevant information given to the pilot which he did not see or hear in the period from run-up to establishment of cruising altitude. Preoccupation or worry about matters pertaining to the flight or to the pilot's personal life operate in the same manner."

Recently the writer, sitting in at a pilot's bull session at a layover point, listened to a conversation dealing with the "difficult" captains with whom co-pilots and engineers had to deal. One captain, speaking of an experience during his copilot days, said, "During the second trip I had with him, if I'd seen we were about to hit a mountain I would never have told him, because I'd know no co-pilot would ever have to fly with him again if we hit."

Preoccupation and intra-crew hostility could each be the subject of an extended paper, and need only to be treated tangentially here. How can team scheduling of flight crews abate their effects?

As O'Kelley suggests above, worry and anxiety produce the preoccupation which we often call carelessness or absent-mindedness. A crew, interacting for a longer period of time than now afforded, would tend to be better appraised of the problems, the anxiety-producing situations of each crew member, and, in the absence of intense intra-crew hostility, would react to alleviate or allow for the effects of the preoccupation. This would be done on the one hand by sympathy and the suggestion of resolutions, and on the other hand by "picking up after" the anxious crew member until a temporary situation was resolved.

Intra-crew hostility would, for the most part, cease to exist, presuming proper operation of matching procedures, and presuming the "safety hatch," a device whereby each crew member would be allowed to "resign" into a reserve pool of crew members maintained to allow for sickness, vacations, and other forms of withdrawal from set crews.

At present a disturbing amount of complacency exists in flight due, primarily, I believe, to the assumption that each crew member has been trained adequately to cope not only with routine matters, but with the most dire emergency. As a long-time observer of flight crews the writer is convinced that this assumption is a misconception. Individuals cannot be separately trained and then expected, at a moment's notice, to combine in an emergency activity requiring superior team work. "The most amazing thing to the student of aviation psychology is not pilot error, rather it is the excellence of pilot success." (O'Kelley, *supra*).

It has been startling to the writer to learn how differently operating crewmen regard the "stop-go" speed during takeoff. This, in brief, is the indicated airspeed before which the takeoff will be aborted if an emergency occurs, and after the attainment of which the takeoff will be continued. This varies for individual pilots between a computed performance speed known as V1 to the speed attained at the moment before the aircraft becomes airborne. The variations can be justified, but rarely are they understood by all crewmen participating in a takeoff.

It is my opinion that many practices of individuals in cockpit crews could be altered or adjusted to, if such crews were periodically trained and checked *as teams.* Even a somewhat undesirable practice could be neutralized if it were detected by fellow crewmen in the training and checking processes.

Flight Efficiency

Included for our purposes in this branch of our subject are not only the factor of flight operation at lowest cost, but also the factors of maintaining schedule, use of every possible flight aid to give passenger and shipper satisfaction, and reporting and suggesting for improvement.

Optimum cruising control requires flight planning, navigation and engine operation to the end that aircraft proceed the greatest number of miles using the least amount of fuel and in-flight time. This has a profound effect upon the cost of operating aircraft, not to mention its relationship to safety. Examination of flight documents indicates that much could be done to motivate crews to improve this feature of their work.

Captains tend to withdraw into those functions of their jobs not involving leadership or management of the remainder of the crew. This seems to be a source of amazement to flight managers, to the Pilots' Assn., and to the captains themselves. It appears not to be recognized by anyone that leadership involves teaching and motivation functions rather than reporting functions. Reporting to a crewman's department manager is currently a captain's only source of control. Naturally in present circumstances he avoids reporting because (1) he can't be sure that incidents occurrring over the short time of a single trip indicate a pattern, (2) his experiences may indicate that reports are ineffective, (3) he doesn't wish to initiate a disciplinary action with which he may be in disagreement, and (4) under the present system he won't have the difficult or inept crewman on his crew very often, and (5) reporting ("snitching") is not valued in the American culture pattern.

Little wonder that flights operate at something less than optimum efficiency.

Employee Satisfactions

It is presumed for our purposes that employee satisfactions derived from the enterprise are considered valuable, and related closely to solutions for the problems of safety, efficiency, and service.

Employee satisfaction contributes to safety, efficiency, and service in that satisfied employees tend not to be preoccupied or hostile, but tend to be interested, effective, and enterprising. The fact is well documented that stability in work in a small group for which each member has a strong feeling of loyalty produces satisfaction.

One peculiar problem which has plagued many flight crew managers has been that of misconduct, especially excessive drinking, at layover points. It hardly seems rational that an employee in a highly responsible position will risk his career by going on a tear some-

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where along his route. But if the atmosphere within a crew is always at the "get acquainted" stage, if employees are always under an impulse that is never more than fragmentarily gratified, then the "cocktail party" tone will prevail wherever crews take their rest along the way.

Status symbols are a problem. "Who Gets How Much of What?" (Business Week, Oct. 16, '54) is an article which flight managers might well study. The status symbols of flight crews are just as effective as those of the business world. Who goes through doors in what order; where one sits in the crew taxi; who gets fed first in the cockpit. All these bits of status symbolism, when in a constant state of flux due to challenge or abdication, are disturbing elements, and offer unsuspected problems.

Employee satisfaction is a highly abstract concept, but it can readily be reduced to a dollar value in the mind of a flight manager who thinks of instances of acts done by employees beyond the strict requirements of duty, of acceptances of hardships without complaint, and of a general feeling of enthusiasm for the success of the enterprise.

Let there be no doubt about what is meant by "satisfaction." It does not mean for us a state of self-oriented complacency, but rather something in the nature of what the business man lists among his assets as "good will"; but in this case the feeling runs, not from customers, but from employees to the enterprise he manages.

An address by Prof. K. R. Andrews raised very important questions: "I think that none of us doubts that individual [flight] crew members are today well enough trained that as individuals they are theoretically interchangeable. But can relationships, for example between first officer and captain, between flight engineer and captain, between stewardess and captain, be changed so easily that the team remains strong as its members are shuffled about? The administrative view of safety suggests this question: is the average crew of a transport aircraft an effective team working under an executive? Is the captain's role defined in administrative terms? Who assigns him his duties? Has the proportion of technical to administrative duties arisen helter-skelter over the years? Is the captain supposed to do most of the work with his hands at the same time he commands the crew and considers the comfort and safety of his passengers? Are his duties organized, and is he constantly training his people? We know how to deal with accident-prone individuals, but are crew composition procedures still accident-prone?"

This, coupled with personal experiences at a small flight crew base where pilot and copilot were scheduled together for long periods, and where other crew members were all well-known and integrated, generated the hunch from which this study stems.

It is my considered opinion, after much reading, observation, and thought, that many of the problems of flight crew managers relating to safety, efficiency, and service, and to employee satisfaction, would be wholly or partially solved with minimal side effects of an adverse nature by the scheduling of flight crews as units for relatively long periods. What I conceive to be important features will be pointed out in the suggested methods for crew composition, scheduling, training, and management which follow:

1. An initial, followed by periodic matching procedures, should be installed to assure maximum compatibility within each crew. Social scientists seem to agree that this is best, and most simply done by the personal preference method. This method was used by the Air Force ("Selection of Compatible Flying Partners," Leslie D. Zeleny, *American Journal of Sociology*, Mar. '47, p. 424). A Flight Engineer told me that in the Strategic Air Command he had been given several complicated tests, after which he had found himself "in a crew that get along swell." Opinion seems to be that personal preference matching methods are not only simpler, but better. The device is a request of a list from each prospective crewman of the 5 persons in each category of the basic crew with whom he or she would most like to be teamed. From these lists a compatibility score could be derived. A further refinement which might prove valuable would be to have a second listing of the 5 persons in each category least desired as a flying partner to the end that an "antipathy score" could be given weight in matching.

In order to accommodate the "odd balls" with whom no one wanted to fly initially, a place in the preference listing form could be made from an answer to the question, "Would you be willing to fly with someone for whom no one listed a preference?" Matching should be a periodic process to realign crews after use of reserves has diluted compatibility.

2. After the matching process each crew should be given a number and scheduled as a unit.

3. Reserve pools (which now exist at some bases) for each category should be established, not only to provide for sickness, vacations, etc., but for an "escape hatch" into which a crewman could "resign" should he find that an intolerable personality clash has developed for him in his crew.

4. A system of measurements of crew excellence should be devised to the end that "top" crews could be commended or rewarded.

5. In the foregoing process both training and enroute criteria could be developed. The most objective possible tests during training periods, and the use of such devices as passenger complaint-commendation score, are suggested. Some measurement of excellence in cruise control would encourage effort in that area.

A Controlled Experiment

Co-ordination in groups has been successfully measured in other industries. The most notable work I have heard about has been done by members of The Technology Project, Yale Univ., in studying the problems of assembly line workers and their foremen. Techniques of observation and interviewing appear to be useful in the study of cockpit co-ordination. Some notable correlations are the difficulty of voice communication due to noise, the tendency—as a result—toward isolated activity and minimum interaction, the high degree of specialization in the presence of complicated machinery, the repetitiveness of activities during long periods, etc.; contrasting features include immediate contract with the "customers" during production (a source of satisfaction), a sense of autonomy for each crew, not only as a temporary group, but of each individual within the group, sharp status distinctions, possibilities for serious emergencies, etc.

It is the purpose of this paper to urge a controlled experiment designed to test the present method of crew composition and scheduling against the performance of a group of crews regularly scheduled as units for an adequate period of time for study.

It is suspected that such a controlled experiment as has been suggested will reveal that stable crews, individuals scheduled together for relatively long periods, will furnish an over-all performance significantly superior to that of the control group.

Reading, experience, and thought have indicated to me that such a testing procedure as has been sketched here will support the hypothesis that flight safety, efficiency, and service, and employee satisfaction will be markedly improved by the establishment of stable flight crews in civil aviation. ✈✈✈

Delhi-Taylor Takes Hangar at Nation's First All-Exec Airport

Delhi-Taylor Oil Co., NBAA Member of Dallas, has announced plans to execute an agreement with Addison Airport, Inc., whereby the airport will erect a 25,600 sq. ft. hangar for the company. The contract will be for 5 yrs., with optional additions of 7 and 13 yrs.

The $2,291,000 Addison Airport, which will be the nation's first exclusive executive and private airport, is now under construction near Addison township, 13 mi. N. of downtown Dallas. The new airport will have a 4500′ hard surface runway 100′ wide, a 5000 sq. ft. terminal bldg. with restaurant and other facilities, 6 hangars, 150 T-hangars, hard surface taxiways and ramps, night lighting and 24-hr. oper.

Sharing space and expenses at the hangar with Delhi-Taylor will be Murchison Bros. and NBAA Member Union Chem. & Materials Corp. According to Henry Stuart, Addison V.P. and Gen. Mgr., the Delhi hangar and runway facilities will be completed this summer.

Safety Exchange

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belief by pilots (other than those specifically authorized by CAA) that mere knowledge of the CAA approved procedure on a private radio facility permits unqualified use of the facility. Such misinterpretations are dangerous for obvious reasons.

Most instrument approach procedures established by CAA on private radio facilities have been for scheduled air carrier use at airports where public radio facilities are not available.

A requirement has generated from business groups, etc, within the regions, to utilize the CAA approved instrument approach procedures on such facilities. There is no compelling *reason* to deny such groups the use of the CAA approved procedures thereon. Certain *minimum safety requirements*, however, must be met whereupon a *Letter of Authorization* may be issued.

The following will be considered minimum requirements prior to such issuance:

1. An appropriate contract must exist between the contractor and the contractee specifying (a) the facilities available (include hours available) (b) the procedures (if necessary) for preventing conflict of traffic between the aircraft of the contractor and the contractee, (c) provisions for air/ground communications as necessary to eliminate conflicts, etc. (This requirement is especially significant where the airport involved is not in a control area.) (d) Monitoring procedures by pilots, (e) Provisions whereby the contractee arranges for copies or plates of the CAA approved instrument procedure and the subsequent amendments thereto. (This matter is normally handled between the contractor and contractee but nevertheless should appear in the contract presented to the CAA for approval). (f) Any other provision deemed necessary by the approving inspector in the interest of safety as may be applicable to *local conditions.*

2. A current CAA approved instrument approach procedure (Master 511 Form) is available for the private radio facility involved.

Letters of Authorization will normally be issued by GSDO General Safety Inspectors. If more than one radio facility is involved, it will not be necessary to issue a separate Letter of Authorization for each facility. In such cases the radio facilities may be multiple listed on a single Letter of Authorization.

If *contract* is received concurrently with application and *does not* meet minimum requirements for issuance of Letter of Authorization, applicant will be so advised and requested to amend his contract accordingly. In this regard, *prior informal discussions* with requesting agencies regarding the CAA requirements herein are encouraged. Such discussions may serve to preclude possible misunderstandings of procedures of policies associated with the issuance of Letters of Authorization, etc.

Associated with the use of private radio facilities is the question of liability in the event of an aircraft accident. The CAA *will not* enter into the question of liability, as it involves a matter confined to the contracting parties concerned in accordance with the local laws.

The CAA position, therefore, is solely one of insuring that all possible precautions and safeguards surrounding use of a privately owned facilities are met prior to the issuance of a Letter of Authorization.

V-123 Washington-New York

Because the Washington-N.Y. route is the world's busiest airway segment, action was taken in April to simplify the route structure.

Northbound, IFR plans should be filed *Riverdale* V-123 to LaGuardia, *Riverdale* V-123, V-166 (eliminating old Baltimore LF Range, R45, V-140, V-123 route) *Red Bank* direct *Scotland* to *Idlewild. Washington* to *Newark* and *Teterboro* remain unchanged.

Southbound, *LaGuardia* to *Washington* remains unchanged except for designation of V-123 in lieu of A7 *Riverdale-Washington. Newark, Teterboro* to *Washington* same but delete the old *Stroudsburg*, V-39 *Parkton* V3 *district Riverdale* A7 route.

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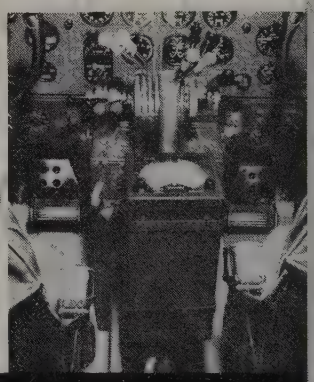

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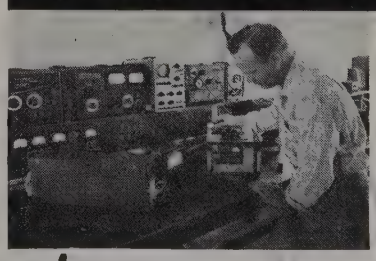

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Trees & Plane

(*Continued from page 13*)

men are flown over the forest after cutting is completed to show them the beneficial effect of selective cutting.

When Halvorson Trees outgrew the Stinson, a Navion was purchased to replace it. The Navion was used so intensively that a line boy at Palm Beach airport once remarked to Roy Halvorson that he saw "one of your other Navions" going North a few days earlier, not realizing that it was the same plane.

Altogether the Navion was flown a distance equivalent to 9 times around the world, and the widening scope of Halvorson's flying, and the increased need for night flying, made it clear that a twin-engine craft was required.

THE HALVORSON *Aero Commander seen through some Halvorson trees. Foremen of the tree-cutting crews are flown over the area to be cut to give them the location of access roads and general character of the terrain.*

Roy says the purchase of the Aero Commander 560 last summer gave him a tremendous boost, "and it really opened our eyes to the every-day utility of a twin-engine airplane in our business." Roy's son Thomas flies co-pilot on the new plane; they both have enrolled in the semi-annual refresher courses given by Flight Safety at La-Guardia, and have both completed most of the required instrument and Link time for an instrument rating.

The Christmas tree business may sound like the ultimate in seasonal work. "But after our rush season is over," says Roy, "we look back at the year's progress and we realize that the airplane has made possible a lot of that progress, for it has enabled us to be at the right place at the right time." Between August 1956, when the Aero Commander was acquired, until May 1957, trips have been made to 18 states, Canada, and various islands in the West Indies. Halvorson Trees have national distribution and a number of foreign markets. With representatives in the most important population centers, it is necessary to maintain close contact, but the Aero Commander gets Roy and co-pilot Tom home from Ohio and Michigan in time for dinner. One of the most important current uses for the plane is to help Roy to introduce Tom to key brokers, and to help Tom to gain experience in the total sales area.

Halvorson reports that the cost of operating his Aero Commander for a 10-mo. period, representing 287 flying hours, insurance, and depreciation projected over 10 yrs., is $49.37 per hr.

Since the Aero Commander is too large for Halvorson's private hangar, it is now kept in the municipal hangar at Duluth Airport, where shelter and ground handling cost $90 per mo.

Because Duluth Airport is near a jet fighter base, air traffic can become high-density very quickly, and Halvorson makes it Rule #1 to keep up to date on the jet traffic patterns. He found that the standard equipment on the 560A Commander was, in his opinion, inadequate for safe operation in very high-density areas, and he consulted Flight Safety, Inc., for their recommendation on supplementary equipment.

The new equipment, being installed by Usher Aviation, New Haven, includes: Collins 51R3 VOR-1 system, Dare DTR-360 180-channel VHF-1 transceiver, ARC ADF-21 system, Wilcox 700B Glide Slope receiver with Collins antenna, Wilcox 702B marker receiver with Collins antenna, ARC F-11A audio isolation amplifier with 2 cockpit speakers, plus a new instrument panel and new radio panel. The original Lear ADF-12 (ADF-2) and Dare VHF (VHF-T2) are retained.

Roy Halvorson is convinced that "the place of a twin-engine aircraft in the operation of a corporation of our size has been very adequately demonstrated," and he is pleased to point out the many people who have heard the gospel of private flying in Halvorson planes.

Practically every major phase of his business is facilitated or carried out entirely with business aircraft. By uncovering new areas for development, protecting crops from natural hazards, coordinating conservation with harvesting and facilitating the operation of a nationwide sales network, Halvorson Trees sets an example of versatility and utilization which is practically a gospel for business flying.

Jeppesen Offers European Edition of Airways Manual

Announcement has been made of the opening of offices and plant of Jeppesen & Co., GmbH, in Frankfurt, Germany, and the publication of a European Edition of the Jeppesen Airway Manual, first steps in the European expansion of one of the world's largest publishers of airways manuals.

The European Edition will offer for the first time a presentation of European airway facilities standardized in one publication and readily available to all pilots. Covering western Europe, the United Kingdom, the north coast of Africa and the Mediterranean area, including Turkey, Greece and Yugoslavia, the 1-volume European edition provides 10 avigational charts, plus airport charts, instrument approach charts, detailed information about radio and meteorological facilities, and coverage of various international regulations and procedures.

Further expansion is planned by Jeppesen to extend service into Mexico, South and Central America, and the Western Pacific area. This further expansion is scheduled to begin during 1957.

March Business Aircraft Market

Shipment during March of 608 2- to 10-place utility and executive aircraft, valued at $9,558,000 (manufacturers' net billing price) has been announced by the Utility Airplane Council of AIA.

The aircraft were sold by 8 U.S. manufacturers, and included 468 planes of 4-place or more, including 90 light twins, and 140 of less than 4-place. Shipment by 7 companies the previous month totaled 461, valued at $7,075,000.

Recent studies show that general aviation (all civil flying except airlines) is at record levels, and flew an estimated 10-million hrs. in the past yr., 3 times more hrs. than the airlines. The active fleet of privately owned aircraft now numbers 65,000.

Over ½ the general aviation fleet is owned primarily for business purposes, and more than 2/3 of the flying hours of this fleet are for some kind of business use. Only about 20% of the total annual flying hrs. are for pleasure or other non-business purposes.

According to the AIA report, March sales leader was the Piper Tri-Pacer (127 units). Among the twin-engine business aircraft, the most popular plane during March was the Apache (49 units). Runner-up among single-engine airplanes was the Super Cub; among the light twins, second position for the month is held by the Cessna 310.

Lumber Co. Plane Pool Becomes Charter Fleet

Incorporation of Inland Empire Airways, a new firm specializing in the charter of aircraft, has been announced by the incorporators, Mr. & Mrs. D. M. Kramer and R. T. Green. The new firm has acquired the fleet of 4 executive aircraft formerly operated as a pool by 7 northwestern lumber companies, and it is reported that arrangements have been made to permit these companies to continue to use the aircraft.

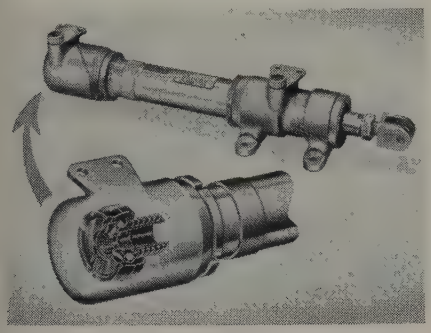
Offices of the new firm will be at Sandpoint, Idaho, and the planes will be headquartered at Sandpoint municipal airport. Kramer has been the airport manager for the past 11 yrs.

Planes acquired by the company include a Beechcraft Twin Bonanza, a Piper Apache, a Cessna 180 and a Piper Super Cub. Pilots for the new firm are Kramer, Warren Ellison, Spokane, and Tom Collins, Bonners Ferry.

The lumber companies used the planes for personnel transportation, emergency hauling of supplies, aerial photo-mapping, surveying road lines, timber-cruising and mapping fire-fighting plans.

Self-Locking Hydraulic Cylinder

Production of a new self-locking hydraulic cylinder designed specifically for aircraft doors has been announced as replacement for mechanical door latches at a weight saving. Envelope



dimensions and weights are said to be approximately the same as standard aircraft cylinders.

The integral lock is operated by hydraulic pressures up to 4500 psi. It can be designed to lock and unlock at any desired pressure and any load in extended or retracted position.

The self-locking cylinders, produced by Ronson Hydraulic Units Corp., bear the trademark "Rhucor". They are made with steel barrels and pistons, with aluminum ends.

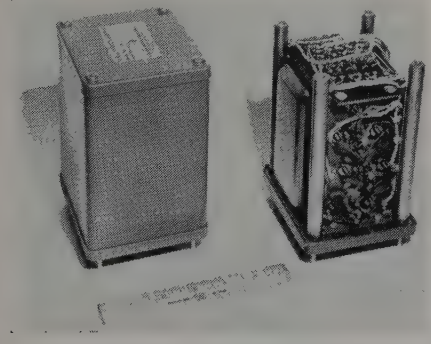
Tubeless DC-to-AC Power Supplies

A series of lightweight, compact DC-to-AC power converters is now commercially available for enabling aircraft, portable and vehicular electronic equipment to be battery powered.

Standard units are available that produce up to 250 VA from 28 VDC input; custom units are available to 2 KVA. Units can be made to meet MIL specs, and are reported to be as compact as 2/3 cu. in. per VA and as light as ½ oz. per VA.

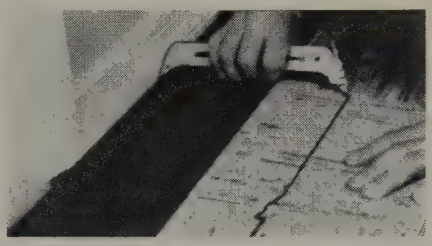
Typical of this series is Model UAC 100VA/115-1000, which delivers 100 VA (100 VAC, 1000 cps at 1 amp), weighs 3½ lb., comes in pack approximately 4" x 3½" x 7".

The manufacturer, UAC Electronics, reports that DC-to 3-phase AC units are available for special applications.



Scriber Simplifies Material Fitting

A new device for the "Do-it-yourself" crowd to make linoleum flooring fit smoothly against irregular walls would



also be useful for the refurbishing of aircraft interiors. Called the "Contour-Scriber," this new product faithfully reproduces on the surface of linoleum, sheet metal, tile, plastic or wood the profile of the irregular surface against which the material is to be fitted. The Contour-Scriber is made of metal, is adjustable to 12¾". Price is about $1.00; produced by Charles Mach. Co., N. J.

Special Mention

Wilcox Electric Co., Inc., has been in production and has made deliveries of its Type 714A Air Traffic Control Transponders since the beginning of 1956. This fact was erroneously omitted from the *Navicom* article in the May '57 issue on the Airborne Radar Beacon Program. Wilcox is now and has been supplying all the ATC transponder equipment being installed in Eastern Air Line aircraft.

Check-fly this new, faster Gull on your operation. Discover the quiet comfort, convenience, greater payload, and safety this husky-hulled "Fly anywhere...Land anywhere" amphibian has to offer. Write for more information on "the 200-MILE-AN-HOUR" amphibian.

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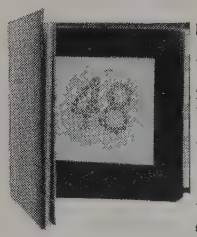

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Jet Noise

(*Continued from page* 11)

do a lot to minimize community disturbance. At most airports there is usually a runway that takes off into the boon docks, and there are others that take off into settled areas. Unless wind conditions are extremely unfavorable, airport authorities can designate jet and conventional aircraft runways for both take-offs and landings, and traffic patterns can be handled in the same manner.

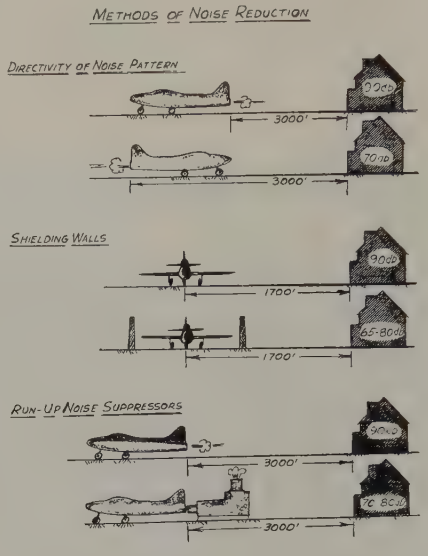
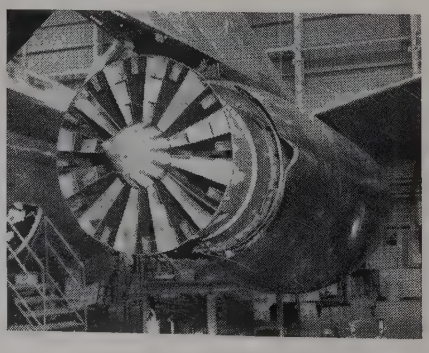


FIG 5

In summary, the reduction of jet noise encompasses many considerations, none of which is particularly knotty. If all aspects are duly considered and met, jet aircraft operations will become as normal as propeller aircraft operations. However, jet pilots and ground crews will have to exercise more consideration in their flying and maintenance operations if they want to avoid complaints. Of course, the big engines put out brute thrust, and thrust and noise go together. However, there is no reason for the small executive jets to be the target of sanctions if they are handled properly. The main point to remember is that jets attract attention, whether they are silently parked, or taxing out to fly quieter (inside), faster, and easier than the propeller aircraft of a passing era.

Old Dobbin and John Q. Public finally got used to the clatter of the horseless carriage—so I hold no fears for the jet.



Suite 344

(*Continued from page* 8)

asst., Dick Groux, attended a flight demonstration of the Atkins Anti-Collision Light at Washington Nat'l. Airport. Joseph B. Burns, NBAA Pres., and Bill Lawton attended house hearings on aviation safety at which the CAA and CAB officials spoke, as well as Mr. Curtis, who spoke on behalf of the Airways Modernization Bd. Bill, which has just been introduced. Also attended the Aviation Writers Assn. luncheon at the Nat'l. Press Club, at which Delos W. Rentzel, Pres. of the Bd., Slick Airways, and Pres. of NBAA member Auto Transports, Inc., Oke City, spoke on *Airlift Gamble*. We at Suite 344 attended the "Man of the Month" party for Mr. Curtis at the Nat'l. Aviation Club. Mr. Curtis also received the Rochester Civic Award last month.

Congratulations to Arnold Johnson, NBAA Rep., American Mercury Ins. Co.; Arnold has been designated Chief Exec. Officer of AMERICO.

Herb Fisher, PNYA, visited Hq this past month. Herb and Bill Lawton attended the NATCC Meeting. Stan Smith, N.Y. Wire Cloth Co., went to Fla. last month seeking a Cessna 310, and was planning to go to Wichita to take a good look at the 620. Henry J. Schiebel, Jr., Grumman Aircraft Engrg. Corp., delivered models of their Navy Cougar and Albatross to Suite 344.

Jack Arnute, Arnute Bros., Inc., and Nelson Rokes, Proctor & Gamble, are looking for good pilots. Bill Robinson and James Herrick of Cessna; Tracy Service, Libbey-Owens-Ford Glass Co.; Dick Rigg and Don King, Owens Ill. Glass Co.—all were welcome visitors.

Thanks to Wm. E. Nichols, Pres. of Internat'l. Aviation Industries, Inc., Westchester Co. Airport, N.Y. Mr. Nichols advised us that he is very much interested in the regional NBAA groups, and will lend a helping hand whenever he can.

June is the month for all Directory of Business Aircraft changes. Address all correspondence relative to changes, membership requirements to NBAA, 344 Penna. Bldg., Washington 4, D.C.

"C. M."

Fertilizer Mined Via Helicopter

A helicopter is making it possible for man to obtain access to $10-million worth of bat guano, to be used as fertilizer and for medicinal purposes, located in a cavern in the Grand Canyon, 600′ above the Colorado River.

The bat guano was first discovered in the 1930's, but has been unreachable until now. The helicopter is being used to erect an aerial tramway running from the mouth of the cave to the canyon rim 1½ mi. across the river gorge. The guano will be vacuumed out of the cave, processed, and carried out in bins over the tramway.

It has been estimated that the cavern contains about 100,000 tons of guano, representing an accumulation of about 60 million years.

All-Weather System

(*Continued from page* 14)

1100 mph, far too fast for complete dependence upon visual perception. TV-Radar will spot such fast-closing targets, as well as blind-spot-hidden targets, at distances adequate for suitable avoiding action. If both aircraft are TV-Radar equipped (and what pilot will want to be without it!) the standard traffic rules can govern the avoiding turns of the mutually seen targets. Altitude and identification information of IFR-plan traffic could be superimposed on the scope initially by the transparent "shrimp boat" method of current Air Route radars and eventually by the Data link Automatic Reporting techniques now under development.

Weather Information Source

When flying within a televised radar net a pilot will be able to spot heavy precipitation, and the accompanying turbulance, by referring to his TV-Radar. If a radar controller were to use the circular polarization circuit to minimize precipitation clutter; by prearrangement during heavy weather, the linear display could be used via an automatic timer for, say, 30 sec. or less in every 3 min. interval along an airway radar surveillance net. This would present the pilot and the radar controller with a combined traffic and weather display. Thus *TV-Radar could replace, to a large degree, the heavy complex and expensive airborne weather radar.*

Written Ground-to-Air Communication

The air route traffic controller with control data for an aircraft under his surveillance might write the following in heavy pencil on a suitable display strip:—

T 10 ↓ 80/SSB. EAC 1020

and insert the strip in a holder before the television camera. The pilot would copy the instructions:—"Transworld Ten, descend to eight thousand after passing Stroudsburg. Expect approach clearance at ten-twenty." He would acknowledge by a short radio transmission:—"New York, Transworld Ten, roger on descent instructions."

Similar use could be found for the written communication function in dense traffic terminal areas. For instance, all aircraft contacting LaGuardia Approach Control must be given, over the busy control frequencies, (1) current weather, (2) runway information and (3) pertinent notams. Constantly sandwiching this necessary information in with descent and vector instructions imposes a heavy workload upon the radar approach controller, and crowds the already well-used approach control frequencies. The information could be televised, superimposed on the ASR scope, in semi-transparent letters.

The radar display can be televised by piping it into the television transmitter directly from the amplifier ahead of the radar tube, bypassing the camera-to-cathode ray tube procedure. This would eliminate the necessity for a repeater scope for televising. A separate camera can be used to televise written control data on the same channel either as a split presentation or super-imposed on the radar in semi-transparent letters. This technique would not seriously interfere with target perception, and could be at periodic intervals *only* if desired.

Televised written data will help relieve the increasing radio congestion by lessening the number of spoken messages.

Air Traffic Control

Two aircraft are vectored out of a holding pattern for an approach to the airport. If the pilot of the second aircraft confirms that he sees his own target, as well as that of the aircraft he is following on the televised radar, the controller can shorten his instructions to: "American Two Eighteen, the target ahead of you is an Eastern Constellation. Maintain the present five miles separation." Thereafter he need only monitor the two aircraft to check the interval as in VFR control.

With a televised image of the Air Route Center Radar before him in the cockpit, the pilot can maintain any given separation interval, and so becomes his own traffic monitor. When all pilots are mutually cognizant as to other pertinent airway traffic, the controller's workload is lightened enormously. A pilot-maintained but controller-monitored separation interval holds out the promise of a safe, smaller interval, accommodating more aircraft

SAC Silver Jubilee Newsreel

BY JACK PATTON

TALKIN' TEXAS!
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AFTER WINNING A WW II CITATION FOR USAF ENGINE O'HAULS, WE LOOKED TO NEW & PEACEFUL HORIZONS
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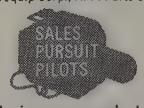
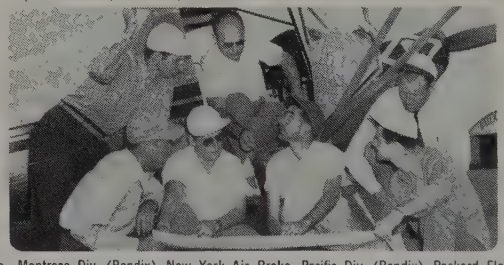
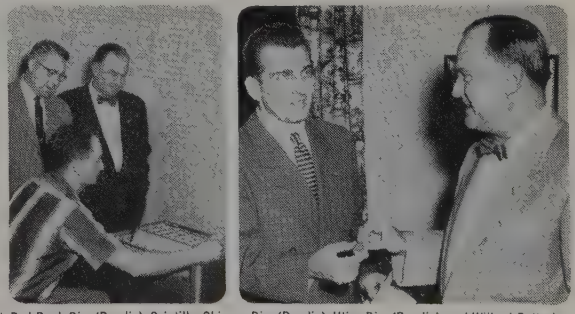


Introducing new products and new ideas to fixed base operators throughout the southwest, SAC's famous "Flying Salesmen" covered the market in Luscombe Silvaires for several years after WW II. Here, VP Paul Kennedy (in plane) briefs a 1947 sales mission for his young pioneers in aviation distribution.



Hamilton Standard, Lycoming, MacWhyte Cable Co., Montrose Div. (Bendix), New York Air Brake, Pacific Div. (Bendix), Packard Electric, Pesco

In close harness with manufacturers, George Jalonick works to further improve his "services of supply" to airlines and overhaul firms. At immediate right, Sales Mgr. Don Morse of Bendix Scintilla (standing, left) joins him to check SAC's Scintilla inventory records. The other photo shows Jalonick receiving the Dallas Jaycee Wright Brothers Medal for community achievement.



Pioneer Central Div. (Bendix), Pratt & Whitney Aircraft, Red Bank Div. (Bendix), Scintilla, Skinner Div. (Bendix), Utica Div. (Bendix), and Willard Batteries

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within a given airspace. Thus, TV-Radar *will safely increase the capacity of the air traffic control system.*

System Acceptability

The electronic know-how needed to devise a suitable system for televising the ground-confined radar scope is available now. A microwave link is in process of being implemented between the N. Y. Center and the metropolitan control towers which will make the long range center scopes available to the towers as a TV presentation. And at the present time a radar weather picture is being televised by microwave link from Big Blue Hill at Milton, Mass. to Hanscomb AFB at Bedford. Raytheon CPS-9 Storm Detection Radar, a high definition General Precision Laboratory vidicon television camera and Raytheon KTR microwave transmitting equipment are used in this system.

The above weather picture can be seen and used with *normal* room lighting. The "Radar Picture Transformer" recently perfected by the Intercontinental Electronics Corp. will be instrumental in providing the required daylight-bright televised image of the radar scope. *TV-Radar will provide the long-sought Daylight Scope for controller and pilot use.* Instead of having radar operations confined to an artificially darkened room, with the control personnel using a few fixed and expensive repeater scopes, one can imagine a televised radar display at the command of every Sector Controller and Supervisor in an ARTC Center, usable with normal room lighting. The Dispatching facility of every airline could as easily have their own TV-Radar receivers. A projected room-size wall display on a translucent screen would be an ideal presentation. The Navy experimentation with projection to windscreen instrumentation holds other possibilities.

The system could be used with equal facility—and with equal low cost—by the Air Carriers, the Armed Forces and the Private Pilot. Heretofore the private and small business pilot has been prevented by cost, weight and space from adopting such airborne luxuries as the DME (cost $5,000) and airborne Weather Radar ($5,000 and up). The projected proximity warning indicator, prior to temporary abandonment, was tentatively priced at $2,500. With televised radar every pilot, whether he flies a Bonanza, a DC-7 or a B-52 could have the advantages of the above-listed aids in a true *pictorial position display, for the cost of one light, comparatively inexpensive television receiver.*

Timeliness

Some time consuming research and development will be required in order to create a low-cost transmitting system, explore transmitting channel availability and devise a compact, rugged, transistorized television receiver. The Boston-to-Washington Radar Airway Surveillance network is now in process of implementation. That net will be followed by another from N.Y. to Chicago, and airway radar coverage will further expand as air traffic inveitably increase. The television transmiting system could be readied in time for simultaneous installation as one homogeneous unit.

The many obvious advantages, the value to *all* who fly, together with the extreme economy of the airborne installation, and its ability to multiply the usefulness of the radar equipment should make it economically feasible. Radar televised into the cockpit would be more than twice as valuable as ground-confined radar alone. Even if the cost of television transmission were to double the cost of the radar network it would still be economically worthwhile. The increased flight safety introduced by TV-Radar, on its traffic warning indication alone, is beyond a dollar-and-cents evaluation.

The problems of jet air travel are with us now, and their urgency is uncomfortably increasing. Perhaps TV-Radar will help answer them.

Trade Show Postponed

The 1st annual National Aviation Trade Show, scheduled to be conducted at Monmouth Co. Airport in N.J. from June 1st-9th has been postponed "because of circumstances beyond the control of the management producing the event." No new date has been set.

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In the Business Hangar

(*Continued from page 22*)

Bendix and ARC radio. Tom Griffith is Pilot. ☐ Green Bros. Const. Co. brought their Model 50 Twin Bonanza in for an engine change. ☐ DC-3 from Spartan Air Services of Ottowa at R-W for installation of Remmert-Werner lightweight landing gear doors, double engine change and geared rudder-tab modification. D. C. Olson is Mgr. of their Maint. Dept.

■ Howard Aero Mfg. Div., San Antonio, sold its 21st Super Ventura to United Transports, Inc., Oke City; Super-V scheduled for delivery in Oct., will cruise at 300 mph, have 2000 mi. range. ☐ Kudner Agency, nat'l advertising agcy., has a new Super-V from Howard. Equipment includes dual Bendix navigation-communication, Bendix radar, Sperry autopilot, JATO.

■ Horton & Horton has completed a custom interior in tone-on-tone blue for the Dove operated by Duplate of Canada, Toronto. Chief Pilot is Frank Vines. ☐ Dale Olsen, Chief Pilot for Aurora Gasoline Co., returned their D18 with H&H modifications including folding cockpit door, certified aft bulkhead removal and beef-up, frosted walnut buffet, "Sky-Hamper" toilet. ☐ Tony Zuma, av. director and NBAA Rep. of Tenn. Gas Transmission, directed refurbishing of DC-3 interior, featuring TGT color scheme, unique ceramic glazed table finish resembling marble. ☐ Capt. Vic Schrager ferried Compania Frutera de Astral's D18 to Guayaquil, Ecuador, after H&H restyling in off-white and charcoal cleanable vinyl with vermillion carpet and curtains.

■ Norman Larson Co.'s PlaneService, Van Nuys, welcomed Lockheed's test pilot, Herman R. "Fish" Salmon, who brought in Lockheed's Twin Bonanza for 100-hr. inspection. ☐ Frank Fleming, Pilot for Ace Drill Bushing Co., flew in for installation of a new Lycoming engine on the Bonanza. ☐ Edgerton, Germeshausen & Grier, Inc., Las Vegas, brought in its recently purchased Bonanza for Narco radio installation. Boyd Carpenter is Pilot. ☐ Jim Kenealy of Kern Mutual Telephone Co. piloted in a Twin Bonanza for engine replacement and installation of an oxygen system.

■ Oakland Airmotive is completing a custom interior and gear change on the Mannix, Ltd., Lodestar, flown in from Calgary by Hal Keefe, Chief Pilot, and Rudy Strick, Flight Engr. ☐ Chuck Forrester brought the J. Ray McDermott Co. Lodestar for OAC Modified Bat Wings installation and angle of incidence change on horizontal stabilizer. ☐ Mississippi River Fuel Lodestar, with Pilot Ralph Primo and Co-Pilot Ray Waldt, is in for installation of fibreglas fuselage saddle and 100-hr. inspection. ☐ Kern County Land Co. DC-3, piloted by Jim Gray and Harvey Rand, has had annual relicense. ☐ Repainting begun on Specialty Union Lodestar, Ron Backues, Pilot.

■ Cincinnati Aircraft, Inc., recently completed radio installation of a new Cessna 310 purchased by Vulcan-Cincinnati. Equipment included: Lear LVTR-36 transceiver; Lear 3-light marker beacon system; L-2 autopilot with altitude control and approach coupler; R-89 glide path receiver; dual ARC-15D omni with auxiliary T-11B transmitter; ARC ADF-21; Flite-tronics transistor CA-2 audio amplifier. Pilot is John E. Piersall. ☐ Al Moyer, of Moyer Bros., Altoona, Pa., owner and Pilot of a new Cessna 310, is having complete navigation and communication system installed. Equipment includes: Narco Sapphire 360/560 Channel transceiver; L-2 autopilot with altitude control and approach coupler; Lear 3-light marker; 10-channel glide path receiver; dual ARC-15D omni with auxiliary T-11B transmitter; ARC ADF-21 with Flite-Tronics transistor CA-2 audio amplifier.

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Left to right are F. H. Isaacks, Manager of Cameron's Southern Louisiana Division; Roy Davis, Domestic Sales Manager, and Herbert Allen, Vice President and General Manager of Cameron Iron Works, Inc.

Seaplane Speeds Service, Cuts Costs for Cameron

CAMERON IRON WORKS, INC., Houston, Texas, manufacturers of high-pressure, off-shore drilling controls and well-head equipment, use their Cessna 180 on Edo Amphibious Floats for sales and off-shore service.

"This plane enables us to serve off-shore installations in the shortest time possible," says Herbert Allen, General Manager. "We are now able to make 10 calls in the same time previously required to make one.

"In addition to saving us valuable time, our Amphibian has enabled us to reduce service expense. The cost on the crew boats previously used was $65 for an 8-hour day. The plane operates at a cost of $22.46 an hour, but in that hour we are able to do what used to be a full day's work."

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SIMPLICITY and PROGRESS

The Business Jet Age:

By Steve Brown
Chief Pilot, Continental Can Company

With about 10 years of proven military jet flying behind us, we can safely and sanely move into the business jet age.

Now that we are about to enter the commercial jet age, I believe the trend toward more and more complex aircraft is being reversed. Relative simplicity of operation will be the keynote of this new era.

I say this not only on the basis of my very limited jet experience: I have yet to read or hear of any pilot who has flown the Boeing 707, for example, and failed to remark on the simplicity of operation he enjoyed during his turn at the wheel.

This can mean a great deal to us corporate pilots and our companies. I am not minimizing the importance of the adverse comments on commercial jet flying that are going around. But it seems to me that many of these criticisms are being made by comparing present military tactical jet operation to future commercial jet flying—a very unfair and misleading comparison.

My company recently placed an order for a number of jet transports. Before we "took the plunge," we gave this future equipment a great deal of serious consideration. Here are some of the factors that influenced our decision:

To begin with, the nation as a whole has about 10 yrs. of proven military jet flying experience under its belt. With this wealth of experience to draw on, I think we can safely and sanely move into the commercial jet age.

Concerning the simplicity which I mentioned earlier, I could do a long article on the aspect of maintenance alone. But I'll save that, except to point out that the spare-parts problem with much of the presently used surplus modified equipment is becoming more and more difficult. When corporations start flying jets, they'll get rid of that headache. (And then there are the man-hrs. spent cleaning dripped oil from hangar floors and even from the upholstery of our present reciprocating-engine equipment.)

There will be about 1/3 *fewer* instrument switches, knobs, and so on in a 4-engine jet than there are in comparable reciprocating-engine aircraft. That means more cockpit space for us pilots. It also means more time to devote to the many problems that come up—and probems sure do come thick and fast when the work load's heavy!

Pre-takeoff time will be saved, too, because jets require no warm-up, no spark plug-ignition check, and a number of presently-used checklists are eliminated.

And how about the speed with which a jet can take you up to cruising altitude! Climbing through 12,000′ of overcast in a jet will be like climbing through 2000′ today. In northern regions, a climb through overcast often results in a coating of ice. This will be practically eliminated with the jets' high rate of climb.

Position reports won't be required any more frequently than they are now. In fact, with CAA's forthcoming long-range radar equipment, we may be able to refine things to a point where one call, prior to a penetration, will be all that's required to go through any given control area.

Check-point and terminal estimates should become more accurate, too, because we'll be cruising higher, in air masses having more constant direction and velocity.

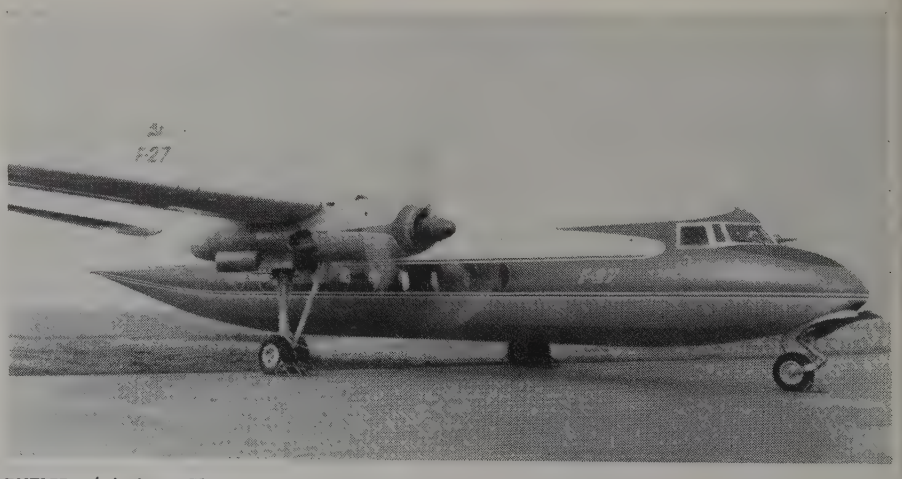
Then there's the problem of holding . . . something that many people are worrying about in relation to jets. Well, for one thing, if we think of reserve in terms of *miles* instead of minutes, we won't be so badly off in the jets. We'll be able to get to an alternate having good weather much faster. So, when the weatherman misses a forecast, and the sky is full of 4-engine planes with plenty of holding-fuel, the corporate jet will be able to "scoot" to a good alternate without much strain.

Another aspect of this problem: we're going to *have to know* our approach time from ARTC, before or shortly after departure, depending on stage length. This, too, will help "clear the air."

It has already been conceded by CAA that there will be little or no difficulty integrating commercial jets into approach traffic, since that traffic already consists of aircraft of differing speeds. In fact, CAA and many others are beginning to predict that jets will be good for instrument approach work, because they have a wide speed range and can reduce altitude and still maintain desirable speed control.

I'm not saying that, with jets, we corporate pilots will have everything our way. There are still plenty of problems to be worked out. But the many simplifications I've mentioned, and others I haven't even touched on, will mean a lot to the corporate pilot, and the company he's flying for.

There are many other factors in jet flying that I'd like to compare to present-day corporate equipment. But, for now, I just want to make it clear that the more you look into this coming commercial jet age, the better it looks for corporate pilots and their passengers.



BUTLER *Aviation, Chicago fixed-base operator, has ordered an executive version of the Fairchild F-27 propjet transport. Paul Butler, company Pres., plans a round-the-world flight as his first trip in the new plane. The F-27, Butler said, "will assist tremendously in our business operations. We'll now be able to cover greater territory, get there faster and more comfortably." The F-27 has 2 Rolls-Royce "Dart" engines.*

GE Tests Turboshaft 'Copter Engine

Designed to give substantial increases in the speed, range and payload of helicopters presently powered by piston engines, the small but powerful T58 gas turbine is now being given pre-flight "physical examination" in a specially constructed helicopter rotor test stand at General Electric Co.'s Flight Test Center.

The T58 turboshaft engine weighs only 325 lb. with reduction gearing, but produces over 1000 hp, a power-to-weight ratio nearly 3 times greater than piston engines now used to power helicopters. High power-to-weight ratio and low fuel consumption make possible significant advances in helicopters.

Developed for the Navy Bureau of Standards by the GE Small Aircraft Engine Dept., the T58 can also be used in convertiplanes, transports, in several new experimental planes, and in non-aviation applications.

The tests include a trial of the T58's new constant-speed control. This hydro-mechanical control is designed to maintain essentially constant rotor speed by automatically regulating engine power, and to eliminate the need for speed adjustment by the pilot during normal operation.

AF, Sabena Airlines Buy Cessna 310; Company Has New 310 Lease Plan

As a result of comparative evaluations made independently by the U.S. Air Force and Sabena Airlines, Cessna Aircraft Co. reports that a total of 88 Model 310's have been sold. At the same time the company announces a new plan which permits a customer to lease a 310 for up to 90 days.

The Air Materiel Command of the Air Force has decided upon the procurement of 80 Cessna 310's for administrative liaison and light cargo. The contract, which is expected to amount to over $5 million, was made as a result of a competition among light twin engine planes.

The 310's will be procured under the "off the shelf" concept, wherein the aircraft is already developed and completely supplied by the contractor. Procurement of these new planes will permit retirement of older WW II planes which require considerable maintenance, and, because the 310 is less complex, substantial savings are anticipated in operating costs. A considerable number of men with priority skills can be released for maintenance of first line combat aircraft.

According to M. F. Mellinger, Cessna export manager, three of the eight 310's purchased by Sabena will be used by Sobelair, a Sabena affiliate. The 3 planes will go into service as cargo and personnel carriers in the Belgian Congo, specially equipped for this service to accommodate stretcher installations.

The other 5 light twins will be used by Sabena in Brussels as instrument trainers for pilot personnel. The aircraft for Belgium will be ferried across the Atlantic in June; initial delivery of the planes to Africa was scheduled for April.

Cessna's new lease plan was developed in cooperation with their wholly owned subsidiary, National Aero Finance Co., and permits business firms to lease a 310 for 30, 60 or 90 days trial.

The lease, which can be justified through tax savings, eliminates the need for a customer to make long range plans until actual experience with the plane justifies purchase.

Cost of the lease is approximately $2000 monthly; this covers all maintenance, hull insurance and taxes, and 50 hours' flying time. Flying time over 50 hours will be billed at $40 per hour. If the customer decides to purchase the airplane at the expiration of the lease, he will receive a credit of $1200 per month of his lease payment toward the purchase price.

Model 310's are presently available for the lease plan through Cessna dealers, and will be equipped with the new auxiliary fuel system and Group 2-C accessories for normal instrument use. These accessories will include the L-2 autopilot with automatic approach coupler and altitude controller, as well as dual ARC omni and oxygen system.

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For full information on cash purchase, lease or financing on one or all of these airplanes, wire or call:

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Airways Facilities

(*Continued from page* 18)

with a clearance authorized by ATC; or, he may detour the weather area under VFR.

A program of airways markings is contemplated which will provide the VFR pilot with both electronic and visual airways boundaries, to eliminate the present dangerous mixing of IFR and VFR traffic.

Instrumentation required under this Dual Mode will require 2-way radio only if the pilot desires, under VFR, to enter high density zones, or if he wants to continue under IFR. Again, a precise barometric altimeter is required to provide accurate altitude separation.

Under IFR conditions, no basic changes from present day regulations are contemplated. A choice of altitudes and routes will be made available to the IFR pilot, none of which are in conflict with the all-weather routes or altitudes.

Clearances will be issued, airspace assigned, and enroute watch maintained as presently outlined. The basic improvement to be noted will be in the numbers of airways, routes and altitudes available, and in the method of shifting ground control from the traffic center to the adjacent centers.

The burden of the proposed air traffic control plan is placed on ground surveillance equipment and on ground controllers. No elaborate machinery or revolutionary "black box" is planned to replace the basic decision-maker, the human being. Mechanized bookkeeping and communications will in many cases eliminate the present workload, which has bogged down our present traffic control system, imposed on the men both in the air and on the ground.

Through efficient and presently available data transfer machines, expected traffic demand can be handled without exceeding 3 aircraft per controller. According to the report, this can be done without materially increasing the number of controllers on duty at the present time. The Engrg. Team states that, at present, there are more controllers on duty in centers and in towers, on some occasions, than there are aircraft flying.

One of the present-day bottle-necks in the efficiency of our airway traffic control system is the slow rate at which aircraft can be brought onto the airport runway, and from the runway to the terminal area. In meeting this problem, the Engrg. Team was faced squarely with the rapid growth of business flying, and its use of varying types of equipment. Among their recommendations for solution to the airport traffic jam are: adoption of parallel runways; separate runways and traffic patterns for light aircraft; adjacent heliport operational areas; separate special instrument landing systems for varying types of traffic and runways.

The new system would handle more planes on a fixed number of routes all the way to the airport. Between Washington and N.Y., for example, there would be 3 northbound and 3 southbound parallel lanes. One airway would be for high-speed planes, another for medium-speed planes, and the 3rd for low-speed planes. Controlled traffic would have 8 altitudes on each airway.

In the initial stages the pilot would navigate in a terminal area by means of a grid superimposed on the cockpit scope. A marker indicating the plane would move along the scope. For initial descent from enroute altitude, each airway would split into 3 lanes, each 3 mi. wide, at a point about 40 mi. from the destination. Radar controllers would instruct pilots as to which lane to choose and the altitude to which they are to descend.

About 25 mi. from N.Y. the descent lanes would feed into a buffer zone 30 mi. wide. In the buffer zone there would be 5 altitudes for each of the 3 speed classes. High-speed aircraft would occupy the highest altitude. Each altitude level would be for a different airport (at present there are only 4 N.Y. airports, but the system will accommodate one more). Planes would be spaced by verbal or automatic instructions from the controller.

From each altitude there will be a fixed descent path into the final buffer zone, which for high- and medium-speed aircraft would be directly over the airport. Low-speed aircraft, with less elaborate equipment, would be accommodated by a large, low buffer zone off to one side.

Reduction of voice communications

while on the ground can be accomplished, the report says, by a system of taxi-guidance and pilot-controller visual signals. One area of exploration in taxi guidance, it was shown, could be a system whereby present-day ILS would be actuated by electro-magnetic tapes buried under taxiways to guide the aircraft through a maze of turn-offs directly to the parking area at the terminal. Illuminated tape signs could be used at warm-up pads to give both take-off and initial ATC clearances, the Engrg. Team believes.

Installations needed for the All-Weather high-capacity runways would be: surveillance radar; VHF and UHF communications; ILS and Precision Approach Radars (PAR); high-intensity approach and runway lights; runways with good approaches; runway painting; high-speed exits with good marking; narrow-gauge flush runway lighting; runway visual range measuring equipment; run-up and by-pass pads at ends of runways; standby power for all facilities; all facilities installed for bi-directional use.

Although the proposed system seems complex on first examination, noticeable improvements are offered to the business pilot:

A reduction in the number of enroute frequencies would be possible.

A reduction in the number of reporting points would be possible.

A simplified air route mapping, whereby reporting points, frequencies and procedures will apply only to the type of flying for which the airplane is equipped or which the pilot can or desires to use.

Provisions are made for off-airways flying under IFR control conditions.

Use of major terminals without conflict with high-speed aircraft.

Business Flying Up 50% Over 1955

The spectacular growth of business aviation is reflected in a 52% increase in both unit production and dollar volume figures for utility aircraft shipments in 1956 over 1955 totals.

The Aircraft Industries Association reports that a total of 6738 units, valued at $103,791,000, were shipped during calendar 1956, compared with 4434 units valued at $68,258,000 in 1955. In terms of units delivered, 1956 is an impressive 51.96% over the 1955 total, while in dollar volume, 1956 was 52.06% better than the 1955 figure.

In 1954, 3071 units valued at $43,461,000 were put into the nation's general aviation fleet inventory. General aviation manufacturers have reported rising production and sales since 1951, when 2302 units were delivered.

The dollar volume achieved in 1956 is based on manufacturers' net billing price. The retail value of the 6738 airplanes shipped would be substantially higher—approximately $130,000,000.

The $103,791,000 figure for 1956 is greater than in any other postwar year, even 1946, when 33,000 units valued at $92,000,000 were produced.

Higher production rates for 1946, 1947 and 1948 resulted from volume sales of small trainer type for use in flight training programs which were very popular following WW II among veterans under the GI Bill of Rights.

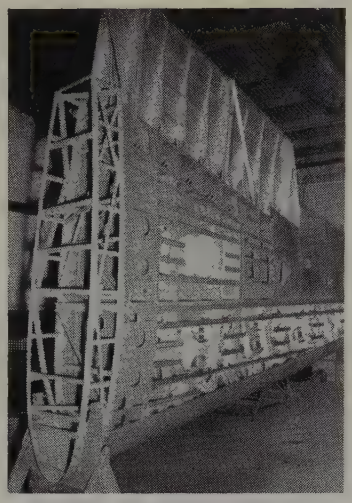
The higher dollar volume in 1956 reflects substantial gains in the number of twin-engine executive aircraft being sold for business, industrial and agricultural purposes: 1050 in 1956, compared with 808 in 1955 and 354 in 1954.

The American general aviation fleet is currently estimated at 60,000 aircraft, AIA reports, a fleet some 35 to 40 times larger than the combined fleets of the nation's airlines. General aviation last year accounted for almost 10,000,000 flying hours, several times the number of hours registered by the country's scheduled airlines.

Business flying itself registered an estimated 5,000,000 flying hours. The business aircraft fleet, which enables forward-looking companies to speed key executives and skilled technicians between home offices and far-flung industrial plants, currently maintains more than 20,000 planes, many of them twin-engine executive models.

December totals for shipment of 1- to 10-place utility and executive aircraft were announced by Joseph Geuting, Mgr. of the Utility Airplane Council of AIA. Of a total 507 planes, 67 were 1- and 2-place aircraft, 440 were 4-place or more. December shipments had a dollar value of $7,886,000.

FLY-MODERN — with LODESTAR "WET WING" CONVERSION



This is more than just a wing. It is a modern wing that gives the Lodestar increased fuel and longer flights.

ELIMINATION OF FUEL NEAR CABIN AREA GREATLY INCREASES SAFETY

New arrangement provides more desirable load distribution. Installation of "wet wing" or integral fuel tanks outboard of the engine nacelles makes it possible to carry 350 gallons in each wing for a total of 690 useable gallons, instead of the 640 gallons presently carried in the inboard tanks. Result of "Wet wing" conversion: additional fuel . . . greater safety . . . better weight distribution.

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Two British aviators, John Alcock and Arthur Whitten-Brown, took off from St. John's, Newfoundland on June 14, 1919 in a Vickers-Vimy biplane, and put down 16 hours and 12 minutes later at Clifden in Ireland.

In this adventuresome era, almost every flyer had an idea of establishing some kind of a record. Out of it, however, many new ideas in aviation were developed, tested and made practical.

Testing was costly to the industry. This financial burden was eased in 1928, when "aviation insurance" was made available with organization of the United States Aircraft Insurance Group, which has served the aviation market continually for the last quarter century.

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INDIANA TECHNICAL COLLEGE

Women's Aeronautical Assn. Trophy Committee Work Under Way

The Business Flight Safety Committee of the Women's Aeronautical Assn. of Kansas Wichita is proceeding with plans for the yearly issuance of brochures and nomination blanks to NBAA, the aviation industry, and eligible nominators in its annual award "for the most outstanding efforts expended by an individual or group in industry towards the promotion of Business Flight Safety."

The presentation of the WAA Business Flight Safety Award is a feature of the annual NBAA Forum. The 1955 award, presented at the 1956 Forum in Miami, by Pres. Marian Higdon, went to Jesse W. Stonecipher, Chief Flight Instructor, Univ. of Ill., for his work in developing the 180° turn procedure, articles on weather flying, and his work in inaugurating a flight procedure at the Univ. The Award for 1954 was given to John P. Gaty, Vice Pres. and Gen. Mgr. of Beech Aircraft Corp., for his booklet *Kinetikos* and for the Beechcraft Safety Suggestion Series, an internationally known business flight safety aid and guide.

The recipient of the Award receives a trophy designed and executed by Rudolph Brom, 4th generation member of an internationally famous gold- and silver-smithing family of Utrecht, Holland.

Winner of the Award is determined from among the nominations by a Selection Committee appointed by NBAA from Nat'l. Aircraft Assn., Flight Safety Foundation, Nat'l. Safety Council, 99'ers, NBAA and WAA.

WAA has done much to foster aviation. Its museum case at Wichita Municipal Airport contains models of all the aircraft manufactured in Wichita. Another WAA project is the aeronautical shelf at the Wichita Public Library, supplemented each year with additional books. Other projects include a scholarship fund for a qualified ROTC cadet at Wichita Univ., a donation to the Wichita Univ. Wind Tunnel, and assistance and donations to various municipal aviation groups and agencies.

New Sealer for Aircraft Piping

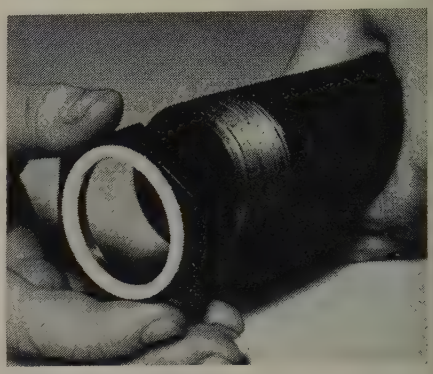
Fourteen aircraft manufacturers are now using a new device, resembling an ordinary nut, to stop leakage in aircraft plumbing, a problem believed to be costing the industry several million dollars annually in wasted fluids and inefficient operations.

The fittings are being used on threaded connections supplying gasoline and oil to the engine, on hydraulic lines to the landing gear, oxygen lines in pressurized aircraft, and water lines for sanitary systems. It can be screwed on all current standard pipe threads like an ordinary nut, and gives a perfect seal against smooth surfaces without sealing compounds.

Results on field use of the new fitting are supplied by the producer, Tru-Seal Div. of Flick-Reedy Corp. Frank Flick, company President, says the fitting will withstand a pressure of 10,000 PSI and temperatures from —200 to 500°F.

Sealing properties of the Tru-Seal fitting are achieved by using an insert of Teflon, a chemically inert plastic which permits use of Tru-Seal with oil, water, air, gas, steam, vacuum and chemical lines without special components. Available in pipe sizes from $\frac{1}{8}$" to $2\frac{1}{2}$".

Since only light torque is needed for effective sealing, the fitting may be re-used up to 50 times, ideal in locations where take-down and reassembly are frequent or where space limits the use of large pipe-wrenches.



New CAIR Radome for Twin Beech

A new radome for installation on Beech D-18 and E-18 aircraft has been developed by CAIR (Chamberlain Aviation, Akron). Designed for use with the new lightweight weather-avoidance radar such as the RCA AVQ-50, the radome is designed for installation on 18's from which the nose fuel tank has been removed. Dome is of molded fiberglass "sandwich" construction.

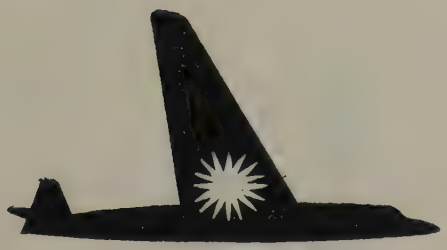
Supplied in kit form with all parts, installation of the dome requires no structural modification, attaches directly to the forward bulkhead in the same manner as the nose door which it replaces. The system is planned for location of radar components in the nose compartment to provide a short wave guide with a minimum of wiring. Radome is hinged for accessibility.

CAA and Link Foundation Test New Pilot Training Course

Ten university students without previous pilot training have been selected to take a new kind of private pilot course which will feature learning to maneuver the plane by reference to instruments. This new approach to the problem of small-plane accidents under adverse weather conditions is being tested at the Univ. of W. Virginia.

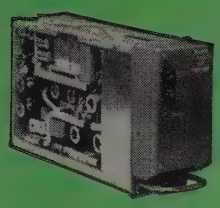
Cost of the course, which will include about 40 hours flight time for each student, is being paid by the Link Foundation. CAA is providing technical supervision and assistance.

According to CAA, private pilots with conventional training have learned to fly solely by reference to the horizon and the ground. As a result, such pilots who unexpectedly find themselves in a cloud or in fog often lose control of the aircraft because of their inability to fly straight and level or make controlled turns by reference to the instrument panel. (*Continued on page 46*)



Faultless in Flight

wilcox type 705 COMMUNICATIONS RECEIVER



For completely reliable communications between aircraft and ground control units (CAA Towers, ATC Centers and Company Operations Departments).

The smallest, lightest weight communications receiver in the history of aviation, the 705 gives you:

- **More Channels . . .** 560 instantly tunable, remotely selected frequencies (every 50 kc channel from 108.00 thru 135.95 mc.)
- **Faster, Simpler Selectivity . . .** selected frequency appears in window on the selector for easy reading. Adjacent channel rejection is 60 db minimum . . . receiver sensitivity 1½ microvolts . . . giving greater VHF range.
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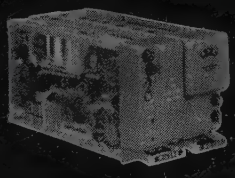
wilcox type 706 NAVIGATION RECEIVER

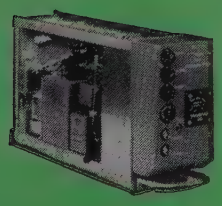


Designed primarily as a navigation receiver for use with ILS Localizer and VOR signals, the Type 706 contains all communications channels as well.

Here is the most accurate, most stable receiver available today . . . only ¾ ATR and weighing a mere 22 pounds in the manual version.

- **Greater Selection of Reception and Presentation . . .** Localizer portion of ILS; Manual VOR; full automatic instrumentation on Radio Magnetic Indicator and voice reception on Localizer and VOR.
- **Positive Reception of Every Available Channel . . .** receiver portion is identical to the Type 705 Communications Receiver.
- **Unique Circuits Eliminate Course Error . . .** Extremes of temperature and variations in plate and filament voltage show virtually no error.

wilcox type 707 VHF TRANSMITTER



In spite of extremely small size—⅜ ATR short length and weight of only 13 pounds, the 707 has the highest power output of any comparable equipment.

- **More Channels . . .** offers voice communications over 360 channels with 50 kc spacing between 118.00 thru 135.95 mc.
- **Less Noise and Interference . . .** operates efficiently at high power under all conditions of interference, making it ideally suited for use aboard commercial and corporate aircraft.
- **Simplified Mechanical Tuning . . .** one compact remote controller may be mounted on instrument panel to operate both the 707 Transmitter and the 705 VHF Receiver—or operate them independently.
- **Fully CAA Approved for Scheduled Airline Use.**

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The new Univ. of W. Virginia course will include conventional training, but will also try to give student pilots the ability to switch readily from visual to instrument flight. The safety factor in such ability is demonstrated by the fact that in 1955 there were 93 small-plane accidents attributable to bad weather.

There will be no attempt to teach the students intentional instrument flying; simply the ability to control an aircraft by instruments if it becomes necessary. One purpose of the test, it is said, is to determine whether effective training can be given without adding to the number of hours of flight time now required by regulations. Another purpose is to learn whether such training can be given with no equipment other than an aircraft with normal instrumentation. Test training will be conducted in a standard single-engine business aircraft.

Another unanswered question is what effect this training may have on pilots who continue their flight studies in an endeavor to get an instrument rating. In an effort to answer this question, some of the ten students may be given some formal instrument flight instruction after obtaining their license.

The students will continue their regular college studies while taking the flight course, which probably will be completed by June. At that time they will be given extensive tests by CAA inspectors on their ability to meet conventional pilot standards and also their ability to use instruments for control.

Airport Use Panel Split On San Diego Case

ACC announced that the Airport Use Panel, unable to reach unanimous agreement on the San Diego, Cal., civil airport problem, is in the process of referring the case to the top Committee for resolution.

In a meeting of the principal members of the Panel, a formal vote was taken on the following motion made by a Dept. of Commerce member: "That the panel approve the proposal of joint civil/military use of airspace in the Kearny Mesa area with the military based at NAS Miramar and Civil Aviation at Montgomery Field with the understanding that 'field carrier landing practice' will be removed from NAS Miramar. Four members of the Panel voted for the motion, 2 against.

The Airport Use Panel is authorized to take final action for the ACC when in unanimous agreement. However, although the air traffic aspects of the proposed civil air carrier use of Montgomery Field and the continued military use of NAS Miramar have been analyzed by the most competent officials to facilitate an ACC decision, this phase of the case will be further screened by Washington Airspace Panel prior to formal submission to the Top Committee.

Since 1951 there have been only 2 other instances in which the Panel has failed to reach unanimous agreement.

New DHC4 Transport Features High Capacity, STOL for Bush Operations

Designed with payload and short takeoff and landing characteristics as primary considerations, DeHavilland Canada's new DHC4 *Caribou*, scheduled for military operational debut in 1959, is the latest of the new developments in agile, high-capacity aircraft of such great interest to business aircraft operators.

The twin-engine *Caribou* is described as being basically in the DC-3 load-carrying category, but with take-off and landing performance calculated at least to equal that of the *Beaver* and the *Otter*. An all-weather utility transport intended primarily as an army vehicle for rapid troop mobility and as a commercial transport for low-cost passenger and cargo transport in undeveloped areas, the DHC4 is designed to operate independently of established airport facilities and to permit take-off and landing on improvised landing strips as short as 800′. Actual take-off distance with zero wind is estimated at 450′.

An unobstructed cabin is provided with direct access through large rear-loading doors. Adjustable loading ramp and freight winching facilities permit rapid loading. These facilities, in conjunction with a 2½-ton payload, 1580 fpm rate of climb and TAS cruise of 185 mph at 7500′ give high work capacity in effective ton-mph.

The structure is conventional and simple. Fitted with R-2000 Pratt & Whitney engines, the *Caribou* can also be operated with R-1820's, and installation of turboprops is reported to be "a practicable consideration." The STOL characteristics are derived from those developed for the *Beaver* and *Otter*.

At a gross weight of 24,000 lb., the DHC4 will have a passenger capacity of 27 seats. Cargo payloads will vary from 6000 lb. with fuel for 200 mi., to 7320 lb. with 600 mi. range. Ultimate range with full standard tanks: 1200 mi.

Touch-down landing speed will be under 60 mph, service ceiling 26,000′. Total take-off distance to clear 50′ obstacle is 800′; landing ground run 300′, total landing distance over a 50′ obstacle 700′. Wing span is 95′. Cabin dimensions: 6′ 11″ wide, 7′ 3″ high, volume 1052 cu. ft.

Estimated direct operating costs are $99.37; direct operating costs per ton-mile estimated at 18.7¢.

An order for 5 DHC4 transports for evaluation by the U. S. Army has been announced. Delivery is scheduled early in 1959, after completion of Civil Airworthiness tests. The first DHC4 is scheduled to fly by midsummer 1958.

Aircraft Efficiency Races for '57 Test Pilot and Maintenance Skill

Six basic premises for the safe and efficient operation of business-type aircraft are combined with the excitement of competition in "Aero-57," the nationwide Aircraft Efficiency Races of 1957, sponsored by AeroDuct, Inc., South Gate, Cal., and open to all pilots from May 1 to July 31, 1957.

"The basic purpose of Aero-57 is twofold," said Alvin E. Hewitt, AeroDuct Pres. "First, to provide the zest of competition to the many pilots who normally make cross-country flights in the course of their business or pleasure.

"Aero-57 has a very serious purpose, too. This is to emphasize the 'Big Six' of good flying—regular maintenance, good flight planning, good pilot technique, good navigation, good cruise control and good sense. Constant attention to these is what gives any pilot top performance from the fine aircraft of today."

The first phase of Aero-57 is the Regional elimination contests. Winners of the Regional Contests will compete in the National Championships to be held over the Labor Day weekend. The Regional Contests are open for entry by any licensed pilot flying one of the 121 handicapped aircraft, which range from Ercoupes to Aero Commanders, and include the majority of unmodified stock single- and twin-engine post-WWII business and private aircraft.

The Regional Contests are point-to-point non-stop flights for range over the greatest distance. Each of the 121 aircraft have been given a handicap range, a conservative distance which each aircraft should normally be able to fly non-stop, given an average pilot and satisfactory maintenance.

Aircraft entered in the Regional Contest are divided into classes. The winner in each class in each of 4 regions is the pilot whose non-stop flight distance, measured point-to-point between airports, is the greatest percentage of statute miles in relation to the handicap range of the aircraft. If the distance from the take-off airport to the destination airport is 500 mi. and a Regional Contest non-stop flight between these two airports is made in an aircraft handicapped at a 400-mi. range, the contestant pilot will have exceeded the assigned handicap by 25%, and that pilot's score will be plus-25.

Entry Blanks and detailed Contest Rules are reported to be available through the 25 AeroDuct distributors located throughout the U.S.

'Copter Added to Sky Harbor Fleet

Mid-States Av. Corp., Sky Harbor Airport, Northbrook, Ill., reports that a new 3-place helicopter has been put into service for instruction, rental and charter. Mid-States also announces that they expect delivery in 1958 of a 4-place Cessna helicopter.

Super Cub Amphibian Developed by Edo

Flight tests have been completed and the first of a number of Piper Super Cub amphibians have been turned over to M. F. Parkinson, of Ser-V-Air, Pascagoula, Miss., who services aircraft for commercial fishing.

The Super Cub amphibians will be used for spotting schools of fish and directing trawlers to the scene by radio. Operating 20 lightplanes, the company provides useful service by increasing the daily catch.

The amphibian Edo floats, similar to the Model 289 floats developed for aircraft in the Cessna 180 class, permit the planes to operate from established airports but provide safety in overwater operation. Under CAR Part 8 the "special purpose" aircraft do not require CAA approved type certificate.

The Model 339 floats designed for the Super Cub by Edo Corp have a retractable 4-wheel landing gear, 2 main wheels aft of the step and 2 castering nose wheels. The wheels are extended or retracted by a hand-operated hydraulic pump located forward of the control stick in the front seat of the Super Cub.

With amphibious gear the cruise speed is 100 mph, 10 mph less than land plane configuration. Rate of climb with a 2000 lb. gross load is reported to be almost 1000 fpm. With a 150 hp Lycoming engine and flaps, take-off performance from land or water is described as "exceptionally good."

Certification plans are pending until a survey of the potential market is completed.

Tucson Av. Committee Resolution On Objections to Airport

The Aviation Committee of the Tucson Chamber of Commerce has unanimously passed a resolution urging the Chamber of Commerce to combat the "unreasonable and unrealistic demands of a very small segment of the population" of the Tucson municipal area "directed toward Davis-Monthan AFB, the U.S. Air Force, and industries situated at or contemplating the use of Tucson Municipal Airport."

Pointing out that the responsible officials have taken reasonable action to reduce or eliminate grounds for objection, the statement says that this antagonism to the activities at the airport threatens the whole economy of Tucson, and is, in addition, "un-American."

Copies of the statement were ordered distributed to the press and to Congress.

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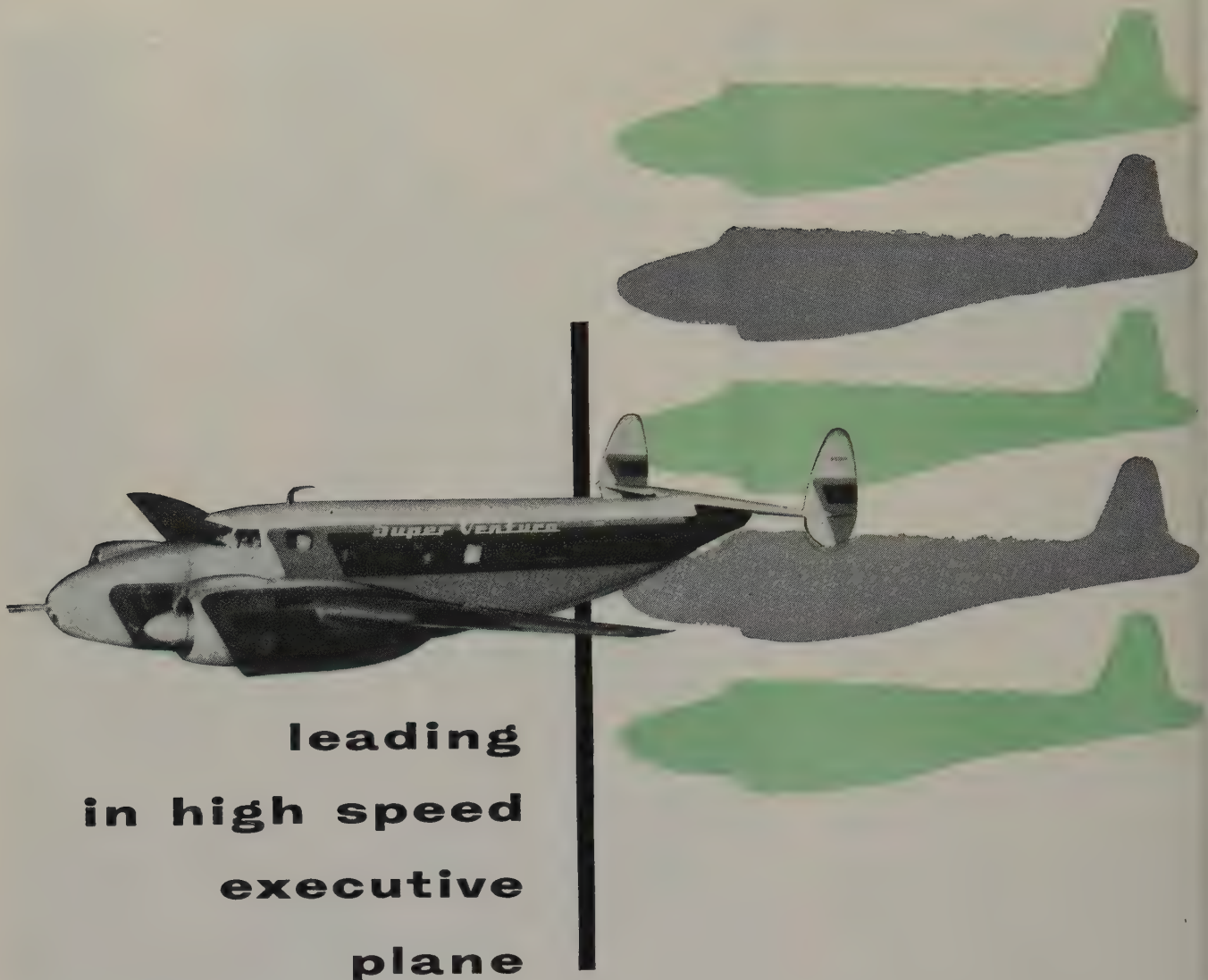

leading in high speed executive plane sales

Twenty-one Super Venturas have been sold to some of this nation's major companies since the first delivery was made in May, 1956. No other airplane in its class has sold as well. There is a reason why — no other executive airplane has all the exceptional features of the Super Ventura. Compare speed, range, safety, cabin luxury, single engine performance and all the other comparative categories and you will agree — the Super Ventura is the finest executive airplane on the market today. Only two of the outstanding features of the Super Ventura is its 300 miles per hour plus speed and its 2,000 mile range. There are many more.

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Weather Bureau Services Threatened by Budget Cuts

Like any government agency or private business, aviation weather services are entirely dependent upon available funds for necessary expansion or improvements. These services are already taxed by the difficulty of trying to keep or attract competent forecast and other personnel to one of the lowest-paid technical services in the country.

Although the flying public, which presumably includes members of Congress, complains of inaccurate and inadequate aviation weather service, the House of Representatives has cut Weather Bureau funds for fiscal 1958 by almost $2-million.

Additional or improved services which will be affected by this cut are:

—2 additional much-needed meteorologists at each of 19 existing Flight Advisory Weather Service Centers, a new one of these centers at Phoenix, Ariz., requiring 7 meteorologists, and 12 meteorologists at the National Severe Local Storm Forecasting Center at Kansas City, Mo.

—Additional full-time observing and pilot-briefing offices at Chicago-O'Hare Airport and Long Beach Municipal, Cal. Previous Air Force weather facilities at these locations are being withdrawn.

—Additional part-time observing stations at Selinsgrove, Pa., Whitehall, Mont., Gooding, Idaho, and Grand Marais, Mich. The CAA Insac personnel who previously provided the observing service at these locations are being withdrawn in favor of remote communications operation.

—The operation and maintenance of newly purchased electronic equipment previously authorized by Congress, which would provide better storm detection and tracking, plus remote reading of IFR weather ceiling and visibility at major airports.

—Rental of high-speed electronic computers necessary to improve methods of weather forecasting.

—Establishment of additional new meteorological facilities such as "end of runway ceiling and visibility" measurements. This well-known and highly-valued equipment will be available at only 16 of the planned 46 airports.

Unless the flying public demands a stop to the bad-to-worse trend in a vital service which already offers so little inducement to competent, dedicated personnel, the effect on general flying safety cannot be calculated.

Ed. Note: see "In Flight Weather Safety Service Program" in *Safety Exchange.*

Removable Equipment Fits C-46 For Aerial Spray Operation

A unique conversion of C-46 aircraft to equip them for aerial spray service without interfering with their lease value for standard cargo service is under way at Newark Air Service, a subsidiary of Lehigh Whse. & Transp. Co.

NAS has successfully completed installation of temporary spray equipment in the first of 3 C-46's on lease from Zantop Air Transport Co. to Lebanair, Inc., a company recently awarded a major contract by the Agriculture Dept. of the U.S. gov't. for aerial spraying of Long Island and Westchester Co., N.Y., and parts of Conn. as part of a program to control the gypsy moth.

NAS modification work involved installation of spray booms, 1600-gal. tanks in the fuselage for the spray chemicals, and pumping equipment. The installation is removable, and permits the leasing of standard C-46 cargo aircraft for spray operations.

The gypsy moth is a northeastern states hardwood forest pest, and the aerial spray program for its control is reported to be the largest single aerial spraying job undertaken in the U.S.

A Business Flying Center is Born

Addison Airport, Dallas' new $2,291,000 business flying center, is the world's most modern, completely executive airbase, with facilities available to service all types of aircraft, single- and multi-engine, and medium transports.

The new airport is located 8 mi. N. of Love Field, 13 mi., or 20 min., from downtown Dallas. Its facilities include a 4500′ asphaltic concrete runway (15-33) 100′ wide; an ultramodern terminal bldg. with office space, a restaurant, sales rooms, pilots' lounge and weather teletype service; 6 hangars, including 2 with 26,000 sq. ft. of floor space; 150 T-hangars; hard-surface taxiways and ramps; TVOR radio facility and night lighting for 24-hr. operation.

In the first stage of construction, Addison will have a 2nd crosswind runway 3200′ long and 200′ wide. The packed-sod runway, later to be hard-topped, has headings of 30° and 210°, and will handle equipment up to and including DC-3's.

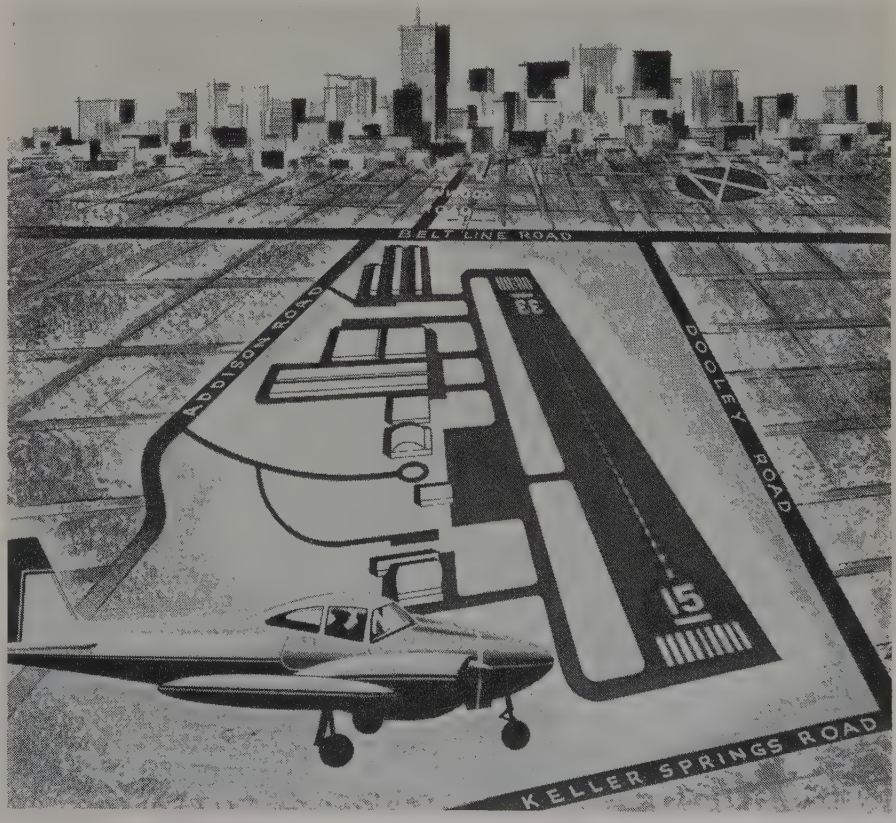
The airport is privately owned. Incorporated, its backers are W. T. Overton, John Murchison, T. L. Wynne, Jr., W. D. DeSanders and J. E. DeLoache. Henry Stuart, former operator of the Park Cities Aero Service, is V.P. & Gen. Mgr.

A detailed survey showed that the entire area of Dallas N. of downtown was not served by an airport, other than Love Field, that had paved runways equal to the requirements of large executive type planes.

Base sites have been leased to Collins Radio Co. for its fleet of airplanes and experimental installations; Associated Radio for sales and service of custom aircraft radio and electronics equipment; Dal-Tex Aviation, Cessna dealer; D & S Aviation Co.; Humble Oil Co. and Delhi Taylor Oil Co. for their business planes, and other organizations.

Providing corporate and private aircraft with modern facilities outside the congested commercial traffic in the Dallas-Ft. Worth area, an expansion program estimated at more than $2-million is planned for the future. The main runway can be lengthened to accommodate almost any size aircraft, and additional hangars can be constructed.

The airport will be opened for operations in June, 1957, and completed in July.



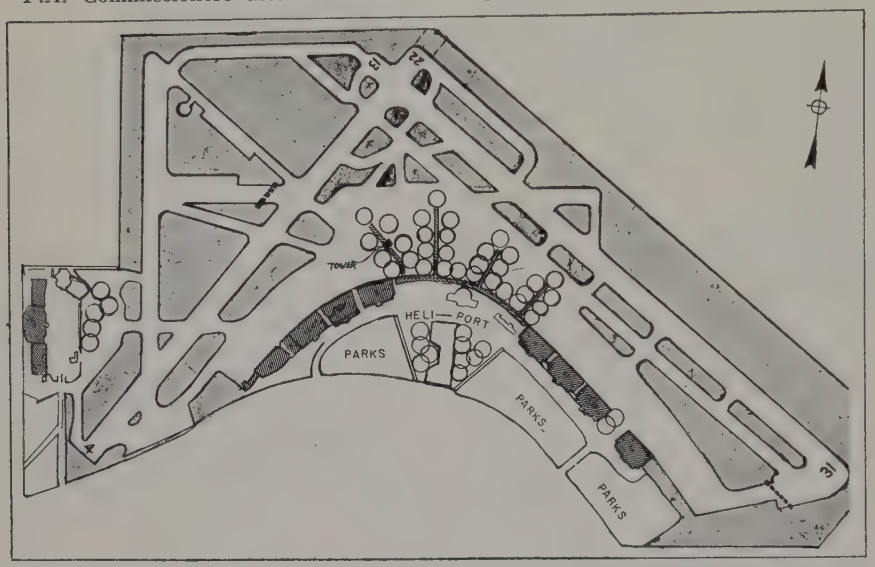
P.A. Authorizes Improvements At LaGuardia, N. Y. International

Two contracts for improving facilities at N.Y. International and LaGuardia Airports have been awarded by the Port of N.Y. Authority.

A $269,609 contract covers construction at LaGuardia of warm-up pads adjacent to Runways 4 and 31, a taxiway 600′ long and 50′ wide to provide access to Runway 4 for aircraft taxing between the Marine Terminal and the W. hangar area, and expansion of aircraft parking facilities at the NW corner of the field. Included in the aircraft parking area improvement is the widening of Taxiway 4 and former Runway 18-36.

P.A. Commissioners also authorized expenditure of $260,000 for construction of roads in front of the temporary Terminal Bldg. at Idlewild under supplemental agreement to a $4,746,000 contract for construction of highways, bridges and utilities in the 655-acre Terminal Area. Completed work will provide the Terminal Area with a 10-mi. network of roads.

This work, as well as that under the original contract, will be completed by June 1, prior to the opening of the International Arrival Bldg. and 2 adjacent Airline Wing Bldgs. now under construction. The Arrival and Wing Bldgs. and the 220-acre "International Park" will be the first facilities completed in P.A.'s $120 million "Terminal City" development project at the airport.



LaGUARDIA 1958: *An artist's conception of the development proposed by the Port of New York Authority for LaGuardia Field. This is a preliminary drawing, subject to change, but shows the position of parking facilities, heliport and tower in relation to runways 13-31 and 4-22 as they are now conceived. The shaded areas represent grass.*

Expanded ATC Program Announced

An "expanded and expedited" 5-yr. program, developed by CAA for modernizing the nation's air traffic control system, has been submitted to Congress. A revision of the plan announced 1 yr. ago, the Federal Airway Plan estimates the cost of equipment needed by 1962 at $810,045,000.

It was explained that telescoping of the program to effect increased readiness for jet transport service, now 2 yrs. off, accounts for the increased cost. The revision also includes a 6th yr. of work, as well as amounts for the VORTAC system.

CAA Administrator James Pyle said that "this first revision of the Plan places continued emphasis on radar as the best available solution to the traffic control problem." The Plan carries a total of 73 long-range air route surveillance radars (ARSR), 23 of which have already been purchased by CAA. It is also planned to extend coverage through cooperative use of military radar.

The Plan requests 115 airport surveillance radars (ARS), of which 47 are operating, 43 precision approach radars, 74 airport surface detection equipment radars, 1230 VORTAC installations, 30 additional ILS, another 89 ILS combined with the distance measuring VORTAC component, 231 secondary radars, and 77 additional airport traffic control towers.

Aerosol Degreaser Spray

New for the fixed base operator is Zipp spray, an aerosol degreaser designed for use on all types of machinery and electrical equipment. Pressurized spray reaches hard-to-clean spots. Zipp is reported to dry rapidly without residual film or vapor. Non-inflammable and nontoxic, it is reported safe for painted surfaces and even concrete floors. Said to be effective in removing grease, oil, carbon, tar, gums and similar substances with or without a water rinse, Zipp will not short electrical equipment. Produced by Stewart-Hall Chem. Co., Mount Vernon, N.Y.

Stewart Air Park

Enroute between the scores of industries in the East and Southwest is Stewart Air Park, a modern business aircraft fixed base in Parkersburg, W. Va., operated by Executive Airmotive, Inc.

The building facilities at Stewart are described as the most modern on any private airport in the U.S. They include pilot's lounge, visitor's lobby, shops, storerooms, administration offices and aircraft storage hangars.

The landing area is north-south, with prevailing winds in those directions 90% of the time. It is 3300′ long and up to 800′ wide. The turf on the field is about 20 yrs. old, tile drained, and the field is used regularly by equipment up to DC-3 size. Executive Airmotive provides services up to and including major airframe and engine maintenance. A large stock of parts is on hand, as well as storage and tie-down facilities and flight training. As Piper distributor for W. Va., southern Ohio and western Md., E-A is also Piper Certificate Service Center.

Stewart Air Park provides fine facilities for patrons as well as for their aircraft. A big feature is "Sky Motel," in which every room is provided with a private bath. Television is also available to guests. Rates range from $5 to $8 for overnight occupancy. Sky Motel is a year-round operation, and affords accommodations for executives and flight crews as well as businessmen flying their own planes.

A new $150,000 Howard Johnson restaurant is located at the Air Park, and is described as the only one of these restaurants situated on an airport.

Another important plus is accessibility. Stewart Air Park offers Air Taxi, car rental, taxi and bus service; rail transportation on the B&O is nearby, and the Sky Motel and restaurant, both located on airport property, are immediately adjacent to Highway 21.

Operation of Stewart is directed by B. D. DeWeese, 25-yr. veteran of aircraft sales, service and flight training.

Preliminary Report: On Mark 450 Twin Turboprop

A new entry in the twin-turboprop executive aircraft field is the On Mark 450, a 425-mph deluxe conversion of the Douglas B-26.

The 450 is being produced by On Mark Engrg. Co., Van Nuys, Cal. A pressurized medium transport designed for compliance with CAR 4b T-category, it has 2 Allison 501-13/15 3750-hp turboprop engines fitted with full

feathering reversible Aeroproducts propellers. Wing- and tip-tank capacity of 2100 gal. provide a range of 3100 statue mi. The pressurization system will provide a cabin pressure of 5000′ at an altitude of 30,000′.

Preliminary data show a take-off gross weight of 40,000 lb., landing weight of 33,000 lb., empty weight of 23,000 lb. Rate of climb at 38,000 lb. is estimated at 3220 fpm with both engines operating, 880 fpm on one engine. Ceiling at maximum continuous power, at 29,000 lb., is 43,500′.

Landing distance at 33,000 lb. over a 50′ obstacle at sea level, with antiskid brakes and reverse propellers, is 2200′.

Price is estimated at $1,180,000. Incorporation of substantial portions of B-26 structure and parts in the 450 permit economies in production.

Deliveries are scheduled for Spring 1959; production rate will be 2 aircraft per month. Each aircraft will be a custom design, with passenger capacity up to 14.

The first plane has already been sold to Maytag Aircraft Corp., Col. Springs.

Vinyl Chart-Pack Facilitates Flight Planning

A new product has been announced by the Krilar Co. which should prove a big help in keeping flight charts and data in one spot, convenient and legible. The "Pac-A-Chart" consists of an envelope of clear vinyl, 19 x 13", with a plastic slide closure. The right side of this outer case is marked with a complete flight log, with spaces provided for write-in data.

A flight mat printed with various flight information, radio-telephone phraseology, VFR minimums, RT code and phonetic alphabet, etc., fits into the outer case. Flight charts can be folded around this inner mat and inserted into the vinyl case, keeping them clean and permitting the pilot to chart his course directly on the vinyl-covered map. A mechanical pencil is provided which gives clear markings on the vinyl. The marks can be wiped off when destination is reached, and the chart is as good as new.

The Pac-A-Chart is a low-cost item, and should be of great interest to businessmen who pilot their own craft.

Fuel Flow System for Business Planes

A low range fuel flow indicating system is available through Bendix distributors to permit business aircraft operators to fly more payload with greater economy and safety by showing exactly how much fuel is being used. By recording any deviation from a specific rate of fuel flow, the indicator also gives advance warning of carburetor icing, and by indicating too lean or too rich a mixture this unit can also help avoid burned valves or uneconomical operation.

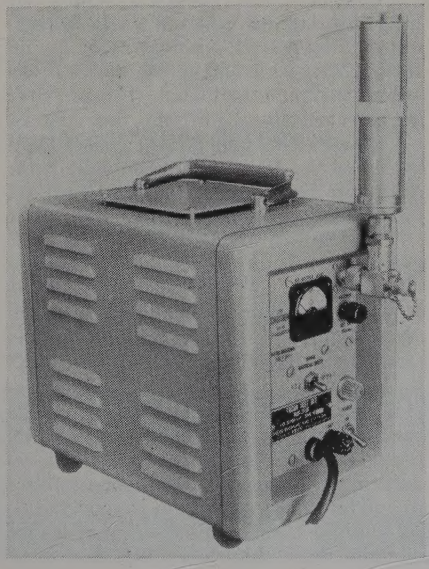
The fuel flow indicator produced by the Eclipse-Pioneer Div of Bendix is said to provide for business aircraft operators the same advantages as the high-range systems built by Bendix for airline service.

A transmitter installed between the fuel pump and the carburetor, and a panel mounted indicator, is required for each engine. Cost varies according to the type of indicator and the number of systems required. According to Airwork Corp., Millville, N.J., the cost of a dual installation would be about $1000. The system is furnished complete with the exception of a power supply. A nominal power supply of 26v, 400 cycles is required.

PILLSBURY *Mills' executive D18 Beech was recently used to prove it was possible to bake a cake at 8000′. Everyone was pleased with the results, and now Pillsbury's top executives can bake their cake and eat it, too, while on business trips. Home economist Ruth Andre is shown regulating the 5-lb., 115v airborne oven.*

Portable Unit Provides In-Plane Testing of Airborne Tacan Equipment

A portable Tacan test set, which permits rapid ground testing of airborne Tacan receiver-transmitter equipment while the equipment remains undisturbed in the plane, has been announced by Federal Telephone and Radio Co. div. of IT&T. Designated Type FTR 3156, the test set may be used with either military airborne Tacan (AN/ARN-21) or the new commercial version recently announced by Federal. The unit tests frequency, sensitivity, power output, range, bearing and identity tone.



Type FTR 3156 weighs 17 lb., measures 9" high, 7" wide and 11½" deep, and is equipped with a handle which permits it to be carried to any operating location up to 60 ft. from the aircraft whose equipment is being tested. It operates from any standard aircraft power outlet (115 v., 60-000 cps, ac). No direct connection to the aircraft is needed and the unit is rainproof.

The portable Tacan test set operates by transmitting simulated bearing and range signals normally transmitted by a Tacan ground beacon station. It provides the bearing signal by continuously transmitting from an antenna a pulse-coded amplitude-modulated rf signal which simulates the signal received by the airborne Tacan equipment when the aircraft is at a bearing of 140° from a beacon station. If the aircraft receiver is operating properly, it picks up the signal and displays a 140° reading on its bearing indicator. The identity tone signal transmitted simultaneously is also continuously tone modulated and provides an aural indication that the airborne unit is receiving it.

In checking range, the airborne unit transmits an interrogation pulse which is picked up by the test set, which transmits reply signals that simulate a range of 5 or 100 miles.

Magnetic Hydraulic Line Filter

Because operation of servomechanisms and hydraulic systems is easily impaired by microscopic ferrous particles suspended in oil or fluid, Wilkinson Mfg. Co. is producing a new magnetic filter which is reported to trap ferrous particles of 2 to 3 microns average size with an operation efficiency of 98% at rated flow and low pressure drop.

Named "Wiltrap," the filter results from extensive research, and is said to be so original in design as to have been granted five basic patents.

Model AM12:0000 Wiltrap for planes is rated at 12 gal/min flow, has an operating pressure of 3000 psi, proof pressure of 4500 psi, operating temperature range of —65° to 275°F.

Information on design variables for individual requirements is available from the manufacturer.

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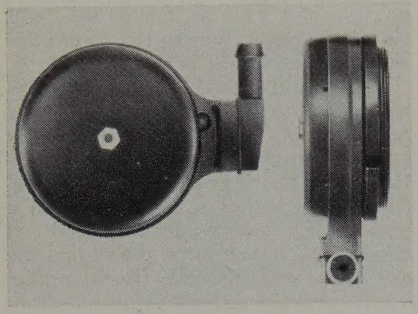
Miniature Oxygen Regulator Features Light Weight, Easy Breathing

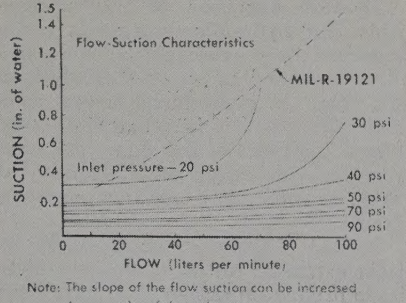
A highly compact miniature oxygen regulator for high-altitude flight which features very light weight and easier breathing of oxygen has been introduced by the Aeronautical Div. of Robertshaw-Fulton Controls Co.



The new regulator weighs only 1½ oz., and measures 1¾″ in diameter and ⅞″ in thickness. It is also said to have exceptionally low suction flow characteristics, which means that the user can draw in oxygen with normal breathing, as compared with the exertion required to open most conventional regulators, sometimes 10 times greater than normal. The amount of breathing effort required with the new regulator is reported below the level established by existing military specs.

The manufacturer points out that this ease of breathing, combined with light weight and simple design, greatly minimizes the fatigue of high-altitude flying. In addition, the low suction required would virtually eliminate the danger of aggravating the effect of mask leaks. The low suction feature would also be of great importance to an ill or injured person experiencing breathing difficulties.

EFFORTLESS BREATHING



Note: The slope of the flow suction can be increased to any value if desired.

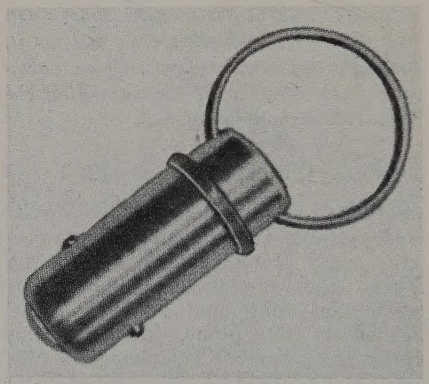
Company engineers also point out the advantage of the regulator's automatic dual functional characteristics. The regulator operates on a mechanical pilot valve principle, and supplies oxygen in accordance with inhalation demands. Oxygen does not flow during exhalation. With increasing altitude, a bellows device responds to reduced barometric pressure and increases oxygen pressure during inhalation in accordance with a pre-determined pressure breathing schedule.

The miniature device is also said to offer improved wearer visibility, and since it has no sliding or moving parts, and no components are aged with ozone, shelf life and durability are "outstanding."

The Robertshaw-Fulton miniature oxygen regulator is expected to find wide industrial application, in toxic or contaminated atmospheres, and in fire-fighting.

New Quick-Release Pins Have Vibration-Proof Rubber Core

Designed for use as shear-pins, lock-pins, hinge-pins and clevis pins, or for any aviation or industrial application where quick attachment and release are desired, "We-Pins", produced by Waldick Engrg. Co., feature locking buttons activated by silicone rubber cores, providing a vibration-proof lock which is also corrosion and temperature resistant.



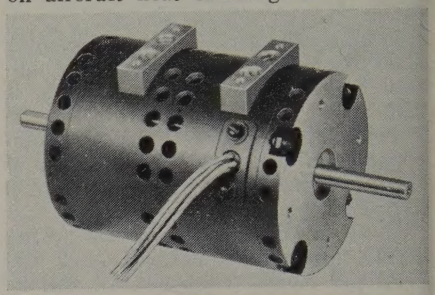
"We-Pins" are installed simply by pressing the pin into the hole. A lock-button, depressed automatically by insertion, pops up on the other side, providing instant attachment. The pin may be released by a pull on the ring or t-handle in the streamlined head. Pull-out load is said to be controlled for each pin size to prevent accidental release; load varies from 10-25 lb.

"We-Pin" is reported capable of holding a shear load of over 3600 lb. in the ¼″ dia. size, and over 58,000 lb. in the 1″ dia. size. Pins are produced in diameters from ¼″ to 1″, graded by sixteenths; grip length varies from ½″ to 4″.

The pins have solid shanks and are made of stainless or hi-tensile chrome-plated or carbon steel for various requirements. The use of silicone rubber to activate the lock-button is reported to be original with Waldick. Pins of larger diameter have dual lock-buttons.

High Frequency Motor Has Double End Shaft

A new 400 cycle AC motor with double-end shaft has been developed by the Aircraft Div. of U.S. Electrical Motors to drive a double turbine wheel on aircraft heat exchangers.



Reported to feature 2-way ventilation for high self-cooling characteristics, this motor, Type A, delivers 1/3 hp continuously up to 50,000′ altitude. The induction type model A operates at 5600 rpm on 3-phase 400-cycle 200v AC, weighs 4½ lb.

Mounting flanges are located at each end of the motor for direct connection to driving equipment. Pads are furnished on the side of the motor for mounting accessories.

Further statistics are available from the manufacturer.

New Narco Unit Simplifies Command of Multiple Radio Installations

Because the various units of a multiple radio installation in a business aircraft are frequently added one at a time, the result may be a complicated array of switches spotted in inconvenient locations in the cockpit. A new radio control unit, recently announced by National Aeronautical Corp. (Narco), Fort Washington, Pa., is designed to integrate control over the most commonly used combination of navigation and communication equipment in business aircraft. In addition to centralizing control over the radio units, Narco's new device is said to simplify field installation of multiple radio units and to provide maximum performance of radios.

Designated VP-8 "Switchmaster," the device integrates control omninavigation system, VHF communications unit and ADF. The 1.6 lb. unit, measuring 3¼ x 3 x 6″, has 3 vertical 3-way switches which permit the pilot to set any receiver for loudspeaker, head-set or stand-by with no audio until needed. A fourth switch mounted horizontally permits the pilot to choose which of 2 transmitters he wishes to use at the moment. A new feature developed by Narco permits the use of a single VHF antenna for both transmitters without the need for a coaxial relay without

(*Continued on page 56*)

SKYMART

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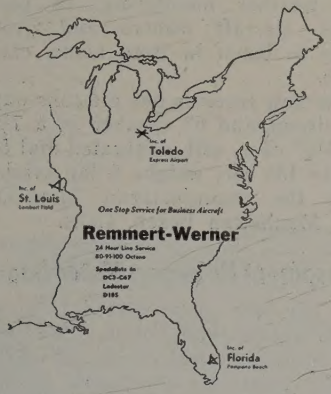

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SKYMART

FAIRCHILD HUSKY F11

Registration CF-BQC; C of A valid to September 7th, 1957; engine P & W R 985-AW 12 B; Engine hours since overhaul 54:15; Propeller type—H.S. 2 D 30-237, Blade 6101 A-12; Hours since overhaul 130:05; Equipment wheels presently fitted, floats—EDO 62-6560 available, spare propeller—zero time, radio—Lear RCBB/T 30 HF radio. Condition—Engine good, Propeller good, Airframe—fair, fabric requires rejuvenation.

BEECHCRAFT D-17-S

Serial No. 203. Registration CF-CCA; Engine P & W R 895-AN14B; Engine hours since overhaul 433:55; Propeller H.S. 2D 30-209-237, blade 6167A-15; Hours since overhaul 632:10; Aircraft C of A valid to June 5th, 1957; time since C of A 253:00; Aircraft total hours 2742:40; Equipment—wheels presently fitted, Radio GE AS1-B; Condition—presently fitted for aerial photography operations, general condition good, flying controls non-standard due to camera aperture.

LANCASTER

Registration CF-IMF, Aircraft total time 1169:20; hours since C of A 276:45; C of A valid to June 7th, 1957; engines Packard Merlin 224; engine hours #1—196:10, #2—291:45, #3—189:20, #4—240:05; propeller H.S. 23 EX 523; propeller times—#1—1169:55, #2—1172:15, #3—1160:15, #4—1127:45; Equipment—Bendix RA—10—HF and LF Receiver, ART—13 HF transmitter modified to crystal control, dual radio compasses, type SCR269G, SCR 274 N HF, Radios consisting of two transmitters and three receivers (transmitters modified to crystal control), SCR 522 VHF transmitter—receiver MN 53 Marker Beacon Receiver; condition—good.

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see page 53

Seat Safety Study Contract Awarded

A research and development contract from the Bureau of Aeronautics has been received by Aerotherm Corp., Bantam, Conn., manufacturers of aircraft seats.

The 3-part contract requires Aerotherm Corp. to conduct a study to investigate energy absorption criteria for aircraft seats; design and develop energy absorption systems for aircraft seats and conduct a dynamic evaluation of same; and to fabricate prototypes of two energy absorption systems completed in the design and development program.

Aerotherm has devoted much of its resources to research, and at the Apr. 17, 1956 NACA conference on *Airplane-Impact Loads, Crash Injuries and Principles of Seat Design for Crash Worthiness* received commendation for its dynamic studies in the delethalization of aircraft seats.

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reducing performance of either transmitter. A single dipole antenna can also be used for 2 VOR receivers operating simultaneously with the VP-8.

A muting relay mutes speaker operation during transmission, and at the same time provides side-tone to the headset regardless of position of the audio selector switches.

Portable Scales Give Aircraft Weight, CG Within Seconds

Portable scales which weigh an airplane and automatically determine its center of gravity have been developed by ARDC, Baltimore.

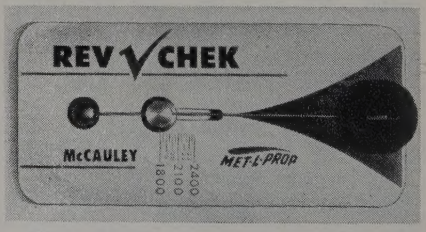
Brig. Gen. T. L. Bryan, Jr., Cmdr. of ARDC's Wright Air Development Center, explained that the new system permits the Air Force to weigh an aircraft on the flight line, and more accurately calculate its weight and center of gravity within a few seconds. Manual calculation requires several hours to determine the center of gravity, and at present aircraft must be weighed on permanent scales within a hangar.

The portable scales weigh 2500 lb. One is placed beneath each wheel of the aircraft, and electronic load cells measure the amount of compression created. This data is transmitted to the computer in the form of electronic impulses, which simultaneously determine the weight of the aircraft and its CG.

Service tests on the new system will be complete this year. The scales were built by Baldwin-Lima-Hamilton Corp., the computer by Continental Electrolog Corp.

Rev-Counter Checks Tach Meter; New Aluminum Prop for Piper Craft

Two new products from McCauley Industrial Corp will be interesting to the businessman-pilot: an inexpensive, completely portable rev-counter, and fixed-pitch aluminum props for Piper aircraft.



The "Rev-Chek" quickly tests tachometer readings. Priced under $6, the instrument is held in the hand and is operated about 30' in front of the plane. Reported to give a precise check on tachometer accuracy, it could help to check why your plane is slow in cruise or take-off.

Aluminum fixed-pitch propellers for Piper Pacer, Tri-Pacer and Super Cub aircraft are offered by McCauley in the new GM series.

The new "Met-L-Prop" has CAA approval for Lycoming engines of 125, 135 and 150 hp used in Piper planes. The 150 hp Piper spinner will fit the Met-L-Prop, and no flange adapter is necessary on any of the three sizes.

VHF Receiver Unplugs for Home Use

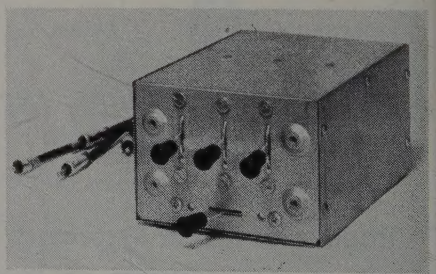
"Air-O-Ear," a portable VHF receiver, is designed, according to the manufacturer, to operate from any 115v AC outlet or any 6v DC jack for reception of radio communication between aircraft, military test frequencies, ground control approach, tower, flight and weather monitoring, to permit pilots, aircraft owners and ground crews to listen in from home, car or plane.

The new receiver has a 6-tube superhet circuit and 6" speaker in a 7½ x 5 x 4½" case, with calibrated dial from 108 to 130 mc, weighs 5 lb. Available from the manufacturer, Nova-Tech, Inc., Manhattan Beach, Calif.

Transparent Hi-Impact Meter Guard

A slip-over meter guard to protect cases, glasses and pointers of electric test equipment with a sheath of high-impact plastic is announced by Electronic Development Laboratories, New York.

According to the company, statistics indicate that breakage of glasses and cases, plus dirt seepage through loose meter glasses, are a major cost item in this field. The guard, now being manufactured to fit Simpson 260, 303, 276 and 880 instruments, is made of "Involex", a plastic reported strong enough to resist hammer blows. Because it is transparent the guard can remain in place while the meter is used.



NARCO *VP-8 "Switchmaster" is designed to simplify installation, integrate pilot command of multiple aircraft radio installation. VP-8 centralizes control Omni system, VHF communications and ADF, most commonly used combination of nav/com equipment in business aircraft. 3 vertical switches permit pilot to select headset, loudspeaker or standby function. Horizontal switch is transmitter selector. VP-8 measures 3¼" x 3" x 6", weighs 1.6 lb.*